United States
Department of
Agriculture

**Forest
Service**

Pacific
Southwest
Region

July 2011

Environmental Assessment for the Plum Project

Tahoe National Forest – Yuba River Ranger District

Plum Project

Table of Contents

ENVIRONMENTAL ASSESSMENT
for the
Plum Project

USDA Forest Service – Tahoe National Forest – Yuba River Ranger District

Project located in Sierra County, California

Chapter I – Purpose, Need, and Proposed Action

Introduction

The Forest Service is proposing to improve forest health, watershed health and wildlife habitat, and reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression, consistent with management direction in the *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment Record of Decision* (SNFPA ROD 2004). The name of the project is the "Plum Project."

Existing conditions within the project area can be improved through a strategic, landscape level approach of pro-active vegetation management. These conditions affect the sustainability of a healthy forest, the associated wildlife habitat and the vulnerability of the ecosystem to the effects of large wildfires.

To accomplish these goals, this project proposes the following treatments on approximately 3,050 acres of national forest lands within the Yuba River Ranger District, in and around the communities of Alleghany and Forest City (T18N R9E Sections 1, 2, 11, 12; R10E Sections 1-12 and 16-18; R11E Section 6. T19N R9E Section 36; R10E Sections 23-28 and 31-36; R11E Sections 19, 30, 31): (1) Mechanical thinning, including the removal of roadside hazard trees within treatment unit boundaries, (2) Hand thinning of smaller sized trees and brush, (3) Machine piling and subsequent burning of slash, brush, small conifers and existing debris, (4) Prescribed underburning, (5) Precommercial thinning (chainsaw), (6) Precommercial thinning (mastication), (7) Oak enhancement (Removal of conifers encroaching on oaks), (8) Building log structures and cover piles for wildlife, (9) Decommissioning, closing, or gating roads that are no longer needed or maintained (approximately 11 miles), (10) Repairing approximately 6 miles of existing roads to implement project activities, (11) Manually removing weeds in specified locations, and (12) Planting conifer seedlings within landings.

Background

Prior to this project's inception, an interdisciplinary Fireshed Analysis that included both the North and Middle Yuba River watersheds was accomplished in May of 2004. The analysis identified areas in need of fuels reduction and stand improvement to reduce the risk of detrimental effects from a major wildfire.

The Fireshed Analysis located portions of the landscape where reducing surface and ladder fuels could reduce extreme fire behavior. This can be accomplished by using a variety of management actions such as reducing the density of trees, re-introducing fire using prescribed burns, removing brush, smaller trees, and understory vegetation.

The analysis supported the need to improve conditions within specific areas of the two major watersheds by moving their existing condition towards a more favorable desired condition. Active management provides numerous opportunities to improve their condition and to meet several resource objectives, especially reducing fuels, improving wildlife habitat, and improving the health of trees within forested stands.

The proposed action continues to build on and further enhance the fuels reduction strategy identified in the Fireshed Analysis. Planned activities within this watershed tie directly in with work done in adjacent watersheds, forming a north-south trending fuels reduction area running roughly from the Alleghany area in the Middle Yuba watershed north to the northern boundary of the district and forest in the North Yuba watershed. Past and ongoing projects that have contributed to this fuel reduction strategy include the Ruby Thinning and Fuels Reduction Project in the Forest City area, the Red Ant Thinning and Fuels Reduction Project in the Goodyears Bar/Saddleback area, and the Canyon Forest Health Project, which runs from Eureka Diggings to Deadwood Peak.

Purpose and Need

The purpose and need for the Plum Project is to improve forest health, watershed health and wildlife habitat, and to reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the case of a wildfire, consistent with management direction in *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment* (2004).

The land allocations within the Plum project area, as identified in the SNFPA are: Wildland Urban Intermix (WUI) threat and defense zones, Home Range Core Areas (HRCAs), Protected Activity Centers (PACs), Old Forest, General Forest, and Inventoried Roadless Areas. Desired conditions, management intents, and management objectives for these land allocations, described in the 2004 SNFPA ROD (pp. 45 through 48), guide the purpose of and need for taking action in the Plum project area.

The Plum project area is located south of Hwy 49 and the North Yuba River, just north of the Middle Yuba River, around the community of Alleghany, to the north, south, east, and west. Elevations range from approximately 3,500 feet in the southwest to 5,800 feet in the northeast. Annual precipitation averages 60 to 70 inches, much of this falling as snow. Forest stand characteristics vary by elevation and aspect within the project area. In most of the project area, stands are primarily of the mixed conifer

series group (USDA 1993). The mixed conifer series grades into the white fir series (USDA 1993) as elevation increases. At the highest elevations, the vegetation changes to the red fir series (Fites 1997). Generally, the southerly facing aspects have higher amounts of pine and oak, especially in the mixed conifer type, and the more northerly facing slopes have higher amounts of true fir.

Over the past 20 years, vegetation treatments within the project area have included commercial timber harvesting, plantation management including release and precommercial thinning, pile burning, and hazard tree removal. Past projects were designed to accomplish a wide variety of resource objectives and were implemented under the guidance of numerous environmental documents.

An analysis of the recorded fire history for the project area and its immediate surroundings indicate that fire continues to influence the landscape. The data from which the tables are derived is the recorded fire history for the Tahoe National Forest from 1909 to 2009. It is understood that these data do not contain all of the fires that actually occurred due to numerous reasons (lack of reporting, differing priorities over the decades, loss of records, etc.). There is however, enough data to demonstrate the continuing influence of wildland fire in the project area.

Table 1-1. Fires greater than 100 acres within and adjacent to the Plum Project Area, 1911 – 2008

Year	Cause	Total Fire Size (acres)
1915	Lightning	192
1916	Human	701
1917	Human	211
1919	Human	460
1920	Human	606
1924	Human	4068
1924	Unknown	16266
1926	Human	186
1936	Unknown	1970
1947	Unknown	1313
1955	Unknown	1486
1959	Unknown	18522
1960	Lightning	4502
2008	Lightning	309

Table 1, *Fires > 100 acres adjacent to project area*

Table 1-2. Fires greater than 10 acres within the Plum Project Area, 1911-2008

Year	Cause	Total Fire Size (acres)	Acres Burned in the Project Area
1911	Human	113	113
1916	Human	701	413
1919	Human	460	70
1920	Human	606	605
1924	Human	4068	1099
1924	Unknown	16266	2014

1926	Human	186	63
1936	Unknown	1970	1963
1959	Unknown	18522	464
1960	Lightning	4502	2427
2008	Lightning	309	51

Table 2, *Fires > 10 acres within Project Area*

These data indicate that between 1911 and 2008 a little more than 9,282 acres within the project area have been affected by wildland fire. This constitutes 49% of the total project area acreage.

Wildland fire is, and will continue to be, a major influence on the vegetation and condition of the area.

As described in the sections below, certain conditions currently exist within the project area, partially as a result of the actions and events mentioned above, that can be improved through a strategic, landscape level approach of pro-active vegetative management. These conditions affect the sustainability of a healthy forest, the associated wildlife habitat and the vulnerability of the ecosystem to the effects of large wildfires.

1. Action is needed to develop more complex, diverse forest structure, both at a stand scale and landscape scale.

Elevations within the Plum project area range from 3,500 feet to about 5,800 feet. In lower elevations, especially on ridgetops and south-facing slopes, large diameter ponderosa pine and black oak stands are common. These stands usually contain thickets of dense noncommercial sized shade tolerant conifers and a mid-story of medium sized moderately shade tolerant to shade tolerant conifers. The understory in these pine-oak stands is often bear clover in the open areas. On lower and more northerly facing slopes, single-storied dense stands of predominantly Douglas-fir over a dense tanoak understory are common. At higher elevations, single-storied stands heavy to white fir predominate. Overall, the pine-oak stands have the most within-stand structural diversity. Throughout the project area, structural diversity exists at the landscape level, but within-stand structure (both horizontal and vertical) is lacking.

The combination of past grazing practices, harvesting practices, aggressive wildfire suppression and warmer and wetter conditions within the last century (compared to previous centuries) have resulted in an existing oversimplified forest structure. Active wildfire suppression has lead to an unnatural buildup of surface fuels and overcrowding of trees.

Historically, fires burned irregularly, leaving trees of various ages and sizes, removing competing understory vegetation, naturally thinning trees, creating openings, and recruiting dead wood in the form of snags and large logs. As a result, fires created within-stand diversity, as well as increased diversity across the landscape. Many of the stands proposed for treatment are lacking this diversity as well as structural components important to wildlife, such as large snags, large downed logs, and multi-layered tree canopies.

2. Action is needed to improve the health and vigor of forest stands.

Overly dense single-storied stands of moderately shade tolerant to shade tolerant species such as Douglas-fir and white fir are not conducive to the long-term growth or maintenance of healthy forest

stands. In the Sierra Nevada, projections are for a warming of about 3 degrees (C) during the 21st century (Hettinger, et al. 2004, pp. 43-46). Predictions also include changes in the timing and amount of precipitation including spring runoff. Increased temperatures and drier conditions will affect the amount and types of vegetation that will grow in a particular area. Trees growing very closely together compete for soil nutrients and water and become weakened. This puts them at risk to insect infestation, pathogens, and drought impacts. In healthy forests, patchy tree mortality creates within-stand diversity and decreases stand density, both desirable characteristics. However, when landscapes containing dense stands of trees experience sustained drought, epidemic insect infestations create extensive areas of tree mortality and fuels accumulation. This is not desirable, especially where goals include reducing the likelihood of a stand replacing wildfire.

Diseases such as annosus root disease and white pine blister rust in sugar pine are prevalent throughout the project area. Increased amounts of dead and/or defective trees can create unsafe conditions for forest users including motorists, mountain bikers, equestrians, miners, and hikers.

3. Action is needed to improve the quality and quantity of hardwoods and native shrubs in the project area.

Currently, the project area and landscape do not contain the desired quality and quantity of native shrubs. Field observations show that the majority of existing shrub patches are over-mature and decadent. Much of the palatable browse is out of reach to browsing animals, and is less nutritious than forage produced by younger shrubs with more vigorous growth. Additionally, the lack of openings in forested stands and greater quantities of duff and litter on the forest floor hinder oak seedling establishment. High numbers of conifers are shading out oaks and suppressing their crown development, reducing acorn production for wildlife. This poorer quality forage limits wildlife populations across the landscape. Declines in forage quantity and quality are projected to continue without active management.

4. Action is needed to improve the health of conifer plantations in the project area.

Conifer plantations in the project area are overcrowded. These conditions reduce tree growth and health and predispose plantations to epidemic levels of insect infestation.

5. Action is needed to reduce fuel loading in areas of dense, smaller trees and thick undergrowth.

The Pliocene Ridge area, where the Plum Project is located, has seen many fires in the past 110 years. The more devastating were the Mountain House fire of 1959 that burned over 17,000 acres and destroyed many homes in the town of Pike, the "1924" fire of 1924 that burned 4,230 acres and came to the edge of the town of Alleghany, and the Lafayette Ridge fire of 1924 that burned 17,000 acres across the river canyon. Smaller fires 100+ acres in size have occurred many times in the past century mainly caused by mining operations. In addition to this fire history, the main reason for treating the fuel build-up along this ridge top is due to the alignment of the critical elements of the fire behavior environment – steep slopes, natural fuel loadings exceeding 10 tons per acre and exposure to winds from all sides. This particular section of the Pliocene Ridge has more than 10 significant drainages on its southern side. The drainages, which funnel winds toward the ridge top, and slopes exceeding 60 percent in some areas expose this ridge top to significant fire potential. Surface fuel loadings and tight crown spacing in this

type of topography and exposure to ridge top winds from all directions add to that potential. Treatment of the ridge top and main travel routes will allow safer access and egress in case of a wildfire, for both private citizens and fire suppression resources.

In addition, areas of dense smaller trees and thick undergrowth exist throughout the project area. These areas contain a high level of contiguous surface fuels creating conditions for more intense fires, including a higher incidence of crown fire, higher mortality of vegetation, greater impacts on soil and water resources, greater risks to firefighters, and greater risks to the communities within the project area.

6. Action is needed to address the impacts of unneeded roads on watershed conditions and wildlife habitat.

The Plum Project area contains a number of Maintenance Level 1 roads (closed to motorized use) as well as unauthorized routes, which are not part of the National Forest Transportation System. Due to their current condition and/or isolated location, these roads are not needed for land management, private land access, or general public use. Some of these roads are resulting in localized adverse effects on watershed conditions and wildlife habitat. All the roads within the Plum project area were analyzed by the Plum Project interdisciplinary (ID) team, and present and future uses of each road were discussed with and approved by the responsible official.

7. Action is needed to control and contain the further spread of noxious weeds.

Surveys and known information indicate there are some localized weed infestations within the Plum project area. Scotch broom is known to occur along the trail in the Long Point area near unit 14, and at the junction of roads 180-13-2-1-1 and 180-13-2-1. Dalmatian toadflax has been found along the Henness Pass road in section 24. Bull thistle occurs scattered in disturbed areas with dense patches occurring in the old landings on the 201-10 Road (access to unit 18) and in unit 15. Tree of heaven is known to occur in unit 15. Controlling localized invasions early is cost effective, compared to the associated costs involved once invasions become widespread.

8. Action is needed to reintroduce fire into the project area's fire adapted ecosystems.

Before fire suppression, fires burned regularly, creating high quality forge and cover, and diverse forest structure and species composition. All of these characteristics are currently lacking within the project area.

Proposed Action

The proposed action is designed to modify landscape-scale fire behavior by implementing management direction for strategically placed area treatments described in 2004 SNFPA ROD Standard and Guidelines #1 and #2 (pg 49). As such, treatment areas were located and treatment prescriptions were developed by evaluating topography, ownership patterns, potential fire behavior, existing vegetative and wildlife habitat conditions, historic recreational use and the location of the wildland urban interface (WUI). Areas were prioritized for treatment based on their stand characteristics, expected effectiveness of treatments, economical considerations, proximity to other treatment areas and their fit into the overall landscape strategy. For this reason, not all areas within the project area are proposed for treatment. The

goal was to initiate treatments in specific locations where the effects of the activities would reduce potential wildfire intensity, improve overall tree health, improve within stand structural diversity, and enhance wildlife habitat across a broader landscape.

Generally, hand thinning would remove smaller trees up to 10 inches in diameter while mechanical thinning would remove selected conifers up to 29 inches in diameter. The actual boundaries where treatments are being proposed are located along strategic landscape features such as existing roads, ridgetops and areas where there are dramatic changes in fuel types and natural topographical elements.

Fuels treatments have been planned along main travel corridors and ridges to compliment strategic control points in the event of a wildfire. Fuels treatments follow Agee's four basic principles of effective fuels reduction: reduction of surface fuels, increase in crown base heights, decrease in crown density, and retention of large fire-resistant trees (Agee and Skinner, 2005).

Specified Maintenance Level 1 roads (closed to motorized use) and unauthorized routes (which are not part of the National Forest Transportation System) are being proposed for decommissioning or removal. Primary benefits of the road decommissioning/removal include erosion control and restoration of the hillslope hydrology. Secondary benefits include protection of aquatic habitat, acceleration of re-establishment of pre-existing native plant communities, and wildlife habitat enhancement. The project is designed to promote natural recovery of the road surface by restoring the natural hydrologic function (infiltration capacity) of the soil in the roadbed, reducing runoff and erosion. For Maintenance Level 1 roads, this operation does not involve complete obliteration of the road. The road prism is still intact along with any cut and fills. If the Maintenance Level 1road was needed at a later time, it could be used but would need vegetation clearing and grading to facilitate use. Road entrances would be blocked by use of gates, log/earthen barriers, or other means to restrict vehicle traffic on the road. Unauthorized routes, which are not part of the National Forest Transportation System, would be obliterated and restored to more natural conditions.

The proposed action includes the following treatments: (1) Mechanical thinning, including the removal of roadside hazard trees within treatment unit boundaries, (2) Hand thinning of small trees and brush, (3) Machine piling and subsequent burning of slash, brush, small conifers and existing debris, (4) Prescribed underburning, (5) Precommercial thinning (chainsaw), (6) Precommercial thinning (mastication), (7) Oak enhancement (Removal of conifers encroaching on oaks), (8) Building log structures and cover piles for wildlife, (9) Decommissioning or gating specific Maintenance Level 1 roads that are no longer needed and removing specific unauthorized routes, (10) Repairing approximately 6 miles of existing roads to implement activities, and (11) Manual weed removal, and (12) Planting conifer seedlings within landings.

A description of each type of proposed treatment is listed below:

Mechanical Thinning – Mechanical thinning is a harvest activity that utilizes ground-based (tractors) or aerial (cable systems or helicopters) logging equipment to remove identified trees while retaining desirable trees in order to accomplish fuels reduction, stand improvement, public safety and/or wildlife habitat enhancement objectives. A network of skid trails (in the case of ground-based thinning operations), landings, and, in some cases, temporary roads (which are removed following project activities) is used to transport and collect harvested material.

Underburning – Underburning is a generalized term used when applying prescribed fire to large areas. Prescribed fire targets surface fuels, some understory, and, in rare cases, larger trees. Surface fuels are the primary agent of fire spread. The objective is to apply controlled fire under optimum conditions where the treatment can modify fuel conditions to effectively reduce fire behavior and the corresponding intensity of a future wildfire. Within some areas proposed for burning, the goal of the treatment may be to consume a significant portion of the understory vegetation in order to reduce future fire severity. In other areas, the goal is to create new growth of native shrub species and forage opportunities for wildlife.

Hand Thinning – Hand thinning is an activity that utilizes crews with chainsaws or handsaws that cut understory conifers less than 10 inches in diameter and brush (greater than 12 inches in height) in order to accomplish fuels reduction, stand improvement and/or wildlife habitat/plant community enhancement objectives.

Machine piling and burning – After small conifers (generally less than 10 inches dbh) and brush (generally greater than 12 inches in height) have been hand cut, the material is piled by a tractor into burn piles and covered with material to keep dry. The piles are subsequently burned in the winter months or during periods of low fire danger. This treatment removes surface and ladder fuels throughout the treatment unit.

Mastication (Mechanical Precommercial Thinning) – A masticator is a low ground pressure piece of equipment that "chews" up brush, small understory trees and downed woody fuels. Mastication does not actually remove any wildland fuels from the treated area, but changes the size, continuity, and arrangement of the fuels, producing a change in fire behavior.

Specifically, the following actions are being proposed:

- Mechanical Thinning to Meet Multiple Resource Objectives: Approximately 1,319 acres of natural stands are proposed for mechanical thinning within the treatment units identified in Tables 1-6, 1-7 and 1-8, and displayed on the maps provided in Appendix A. The identified natural stands would be thinned primarily to improve conditions for shade intolerant species such as oaks and pines, create a more diverse stand structure containing clumps and small openings (up to 1/4 acre in size), and to improve overall tree health and resistance to insects and disease. All trees 30 inches dbh or larger would be retained (SNFPA 2004) except for hazard trees. Areas of diverse stand structure valuable to wildlife would be protected from harvest operations. Thinning prescriptions would strive to meet multiple resource objectives including economic feasibility. All thinning treatments would be consistent with the SNFPA ROD standards and guidelines for mechanical thinning treatments (Standards and Guidelines #6 and #7, pp. 50-51). Various follow-up fuels treatments are proposed for the mechanically thinned natural stands. These are described below under the sections titled: "Hand Thin and Machine Pile to Reduce Surface and Small Ladder Fuels," "Underburning," and "Other Follow-Up Fuels Treatments."

  Approximately 419 acres of older pine dominated plantations are proposed for mechanical thinning. Trees within these plantations range from 6 to 16 inches dbh. Thinning would reduce stand density to approximately 70 to 90 trees per acre. While the plantations would continue to

be predominantly occupied by pine following thinning, healthy, vigorous conifers other than pine would be favored as leave trees. Hardwoods at least 2/3 the height of the surrounding stand would be released from conifer competition. Trees would be whole tree harvested, and the material would likely be chipped on site. Follow up underburning in the treated plantations would be conducted to reduce competition and fuels, creating a healthier residual stand.

- Oak Enhancement: Oak enhancement treatments would be conducted within the proposed thinning units. Smaller diameter conifers less than 10 inches dbh would be removed from beneath and around oaks in units 29, 19, 23, 24, 25, 33, 2, 7, 11, 21, and 22 (in that order of priority, determined by the predominance of oak occurring in the stand). Conifers would be selected to reduce competition, or those that could shade out oaks over time.

- Hand Thin and Machine Pile to Reduce Surface and Small Ladder Fuels: Along ridgetops, surface and ladder fuels would be reduced to less than 5 tons per acre to create opportunities for fire suppression. These actions would allow greater access and egress for local home owners and firefighting resources in the event of a large wildfire. Specific treatment actions include the thinning of trees less than 10 inches dbh by chainsaw (hand cut) followed by the piling of those and residual surface fuels by machine (bulldozer). The piles created would be burned in the fall and winter months, and an underburn of the entire unit (Units A, C-H) would occur within 5 years.

  Some of the hand thinning and machine piling treatments would be conducted as follow-up fuels treatments within the ground-based mechanical thinning units. (Refer to the maps in Appendix A and Table 1-7.) In those units where both hand thinning and mechanical piling are proposed, regardless of other treatment occuring on those same acres (i.e. ground-based mechanical thinning), hand cut/machine pile treatment would only occur where excess ladder and surface fuels remain after harvest. In units where hand cut/machine piling is not necessary, underburning (see below) would be applied to achieve the goal of less than 5 tons per acre loading of surface fuels.

  Ground-based mechanical thinning units that do NOT overlap with proposed hand cut/machine pile treatment units would be assessed for possible piling of activity fuels post harvest (where slopes allow), burning of piles, and follow up underburning (see below). These treatments would occur only as needed to achieve a goal of 10 tons per acre or less of surface fuel loading.

- Underburning to Reduce Surface Fuels: Underburning would be used on approximately 1,242 acres to remove activity generated fuels as well as naturally occurring fuels that have accumulated over time. In some places, underburning is the sole treatment while in other areas it is proposed as a follow-up fuels treatment following mechanical thinning (either ground-based or aerial). (Refer to the maps in Appendix A and Table 1-7). The intention of this treatment is to reduce the surface fuel loading to levels that, when exposed to wildfire, would burn with lower fire line intensities and rates of spread. This change in fire behavior would allow safer suppression of wildfires and likely reduce them from large stand-replacing fires to smaller fires with less severe effects on vegetation, wildlife habitat, watersheds, and other forest resources.

- Log Structures and Cover Piles: Cover for smaller animals and prey species would be improved, where cover and/or large log structures are lacking, by cutting slash and smaller diameter trees (less than 10 inches diameter) and re-arranging them to create cover piles and log structures within treatment units. Priority areas would be near riparian areas and within sensitive wildlife species habitat. Cover piles would not be placed in areas of sensitive plants. Cover piles are proposed within approximately 10 percent of the area within proposed units. In general, cover piles would not exceed an average of 10 per acre. The district biologist would coordinate with the district fuels specialist to locate these log structures and cover piles to avoid site-specific fuels concerns at the time of project implementation.

- Large Tree Protection: Within planned underburn units, remove heavy accumulations of duff and down material from around the boles of selected large trees greater than 30 inches dbh for added protection before underburning.

- Borate compound application: Around individual high value trees, in recreational areas, or in stands of healthy true fir, treat freshly cut stumps greater than 14 inches diameter with a registered borate compound to minimize the creation of new root disease infection centers.

- Precommercial thinning (chainsaw) to Improve the Health of Plantations: Thin existing plantations using chainsaws. The target stocking level would range from 90 to 150 trees per acre depending on site conditions. Hardwoods would be retained, and they would be released from conifer competition. Scattered clumps of vegetation would be left to promote structural diversity and cover desirable to wildlife. Fallen tree boles and limbs would be cut to lengths of 4 feet or less. Slash depth would be reduced to acceptable levels (as specified by the fuels specialist) by lopping and scattering of cut material. Slash created within 50 feet of National Forest System roads and county roads would be chipped.

- Precommerical Thinning (mastication) to Improve the Health of Plantations: Thin existing plantations using mechanical mastication. Masticate trees and brush to reduce inter-tree competition, increase average crown base height, and reduce ladder fuels. The target stocking level would range from 120 to 150 trees per acre. Leave trees would favor species other than pine in these pine dominated plantations. Hardwoods would be given preference as leave trees and released from conifer competition where they are at least 2/3 the height of the surrounding conifers.

- Weed Control: Control scotch broom by hand clipping or pulling where it is present along roadsides and within units and landings. To reduce the likelihood of resprouting, where practical, clipping should occur during the late summer, with plants clipped close to the ground to reduce resprouting (Bossard and Rejmanek 1994). Weed wrenches may also be used (Bossard et al 2000). Within units proposed for prescribed fire, follow up treatments that incorporate successive burning may be used in localized areas to control this plant (Bossard and Rejmanek 1994).

- Manually treat the following site specific weed occurrences prior to implementation of the project and annually until the soil seed bank is depleted *(funding dependant)*:

Use weed wrenches and/or hand pull scotch broom located along the trail in the Long Point area near unit 14 and at the junction of roads 180-13-2-1-1 and 180-13-2-1.

Hand-pull any seedlings of Dalmatian toadflax found along the Henness Pass road in section 24.

Dig up bull thistle rosettes prior to blooming in old landings on 201-10 Road (access to unit 18) and in unit 15.

Hand-pull seedlings of tree of heaven in unit 15. Manually remove shoots twice per year. Do not increase sunlight to the existing full sized trees.

- Road Repair: Harvest activities would require approximately 6 miles of road repair. Types of repairs include: roadside brushing, reconditioning drainage structures such as dips, water bars, and roadside ditches, culvert cleaning, surface grading, hazard tree felling, and potential spot rocking.

Table 1- 3. Plum Project Road Repair

Plum Project		Road Repair
Rd_ID	**Miles**	**Comment**
0180-013	1.72	Plum - ML2 - Repair
0180-013-02	2.53	Plum - ML2 - Repair
0201-010	1.25	Plum - ML1 - Repair
0301-004	0.52	Plum - ML2 - Repair
Total	**6.02**	

- Removing Hazards Created by Danger Trees: Per district hazard tree guidelines (available upon request, at Yuba River RD), identify and remove hazardous trees along maintenance level 3, 4, and 5 National Forest System roads and high-use recreational/administrative sites within thinning unit boundaries only.

- Road Maintenance: Maintain approximately 21 miles of National Forest System roads to provide access to treatment areas, provide for public and contractor safety, and improve watershed conditions through erosion control and road surface protection. This work includes: grading, clearing, ditch cleaning and repair, and hazard tree removal.

- Decommissioning/Closing/gating: For watershed and wildlife habitat improvement, decommission approximately 3.88 miles of Maintenance Level 1 roads (which are closed to motorized use) and remove approximately 3.35 miles of unauthorized roads, which were not added to the National Forest Transportation System under the *Tahoe National Forest Motorized Travel Management Record of Decision* (2010). (Refer to the table below, as well as the attached map.) Install a gate, controlling access on approximately 1 mile of road (180-14) that is currently open for public use.

It should be noted that the Proposed Action has undergone incremental changes since it was first shared with the public during the public scoping period of July 15, 2010 to August 15, 2010. The initial proposed action involved decommissioning approximately 10.49 miles of roads.

The Proposed Action was slightly revised after receiving and analyzing numerous comments from members of the public. Changes from the original proposed action decreases the miles of roads planned for decommissioning from 10.49 to approximately 7.23 miles. The following table shows the specific roads (the incremental changes of the proposed action) in road numbers and miles of roads no longer proposed for decommissioning.

Table 1-4. Incremental Changes to Proposed Action – Road Closure/Decommissioning. [1]

Plum Project		Revised Road Decommissioning
Rd_ID	**Miles**	**Comment**
84-02-01	0.40	Proposed Decommission
84-02-02	0.50	Proposed Decommission
84-07	0.40	Proposed Decommission
180-013-02-01	0.63	Temp. Road, Proposed Decommission as a road; convert to public trail.
0180-013-02-01-01	0.10	Temp. Road, Proposed Decommission
0191-034	**0.29**	**Dropped from Decommissioning**
0201-002	0.79	Proposed Decommission
0201-002-01	0.17	Proposed Decommission
0201-008	0.28	Proposed Decommission
0201-009	0.47	Proposed Decommission
0294-004	**0.68**	**Dropped from Decommissioning**
0301-012	0.14	Proposed Decommission
U18100205	0.08	Proposed Decommission
U18093604	0.03	Proposed Decommission
U18093605	0.07	Proposed Decommission
U18090101	0.24	Proposed Decommission
U18093603	0.13	Proposed Decommission
U18100409	0.07	Proposed Decommission
U18091206	**0.12**	**Dropped from Decommissioning**
U18091204	**0.11**	**Dropped from Decommissioning**
U18103306	**0.21**	**Dropped from Decommissioning**
U18091202	**0.30**	**Dropped from Decommissioning**
U18100502	**0.29**	**Dropped from Decommissioning**
U18100410	0.25	Proposed Decommission
U18100408	**0.34**	**Dropped from Decommissioning**
U18100406	**0.22**	**Dropped from Decommissioning**
U18100407	**0.12**	**Dropped from Decommissioning**
U18090103	0.19	Proposed Decommission
U18103601	0.02	Proposed Decommission
U19102401	**0.28**	**Dropped from Decommissioning**
U19103303	0.23	Proposed Decommission
U19102501	0.20	Proposed Decommission
U19112003	0.02	Proposed Decommission
U19112002	0.12	Proposed Decommission
U19111902	0.23	Proposed Decommission
U19102402	**0.10**	**Dropped from Decommissioning**
U19112003	0.44	Proposed Decommission
U19112001	0.16	Proposed Decommission
U19100501	0.61	Proposed Decommission
U19102603	0.14	Proposed Decommission
U19102601	0.11	Proposed Decommission
U19102303	0.20	Proposed Decommission
Total - 10.49 miles	**(7.23 mi) (3.26 mi)**	**3.26 miles Dropped from decommissioning**

[1] *The term "Decommissioning" is used for unauthorized routes to mean that they could be removed/restored, as well as for authorized routes that are proposed for closing/removing/restoring.*

Identified roads (see Appendix A maps) would be closed/decommissioned through the Timber Sale Contract, if used by the Purchaser, after harvest. The remaining roads would be closed/decommissioned using other funds as funds become available.

Implementation of the project's proposed activities (as previously described) is dependent upon obtaining sufficient funding and/or human resources from a variety of sources. Sources can include volunteer groups, grants, appropriated funds and funds generated from the sale of wood products. Fluctuating market conditions and the demand for wood products can also influence the amount of available funding.

The following is a treatment summary for the actions proposed under the Plum Project**:**

Table 1-5. Plum Project Proposed Fuels Treatments:

Unit Designation	Estimated Unit Acres	Proposed Treatment	SNFPA Land Allocation	Primary Purpose for Treatment
A	43	Handcut/Tractor Pile	Defense Zone	Fuels Reduction/Wildlife Habitat Improvement
C	67	Handcut/Tractor Pile	Threat Zone	Fuels Reduction
D	76	Handcut/Tractor Pile	HRCA/Threat Zone	Fuels Reduction
E	61	Handcut/Tractor Pile	HRCA/Threat Zone	Fuels Reduction
F	54	Handcut/Tractor Pile	PAC in Threat Zone/HRCA	Fuels Reduction
G	56	Handcut/Tractor Pile	PAC/Threat Zone	Fuels Reduction
H	46	Handcut/Tractor Pile	Defense Zone/HRCA	Fuels Reduction/Wildlife Habitat Improvement
I	807	Underburn	PAC/HRCA/Threat Zone	Fuels Reduction/Wildlife Habitat Improvement
J	435	Underburn	PAC/Defense Zone/HRCA/Threat Zone	Fuels Reduction/Wildlife Habitat Improvement
Totals:	**1,645**			

Table 1-6. Plum Project Proposed Mechanical Thinning Treatments:

Unit Designation	Estimated Unit Acres	Harvest System	Follow-Up Fuels Treatment	SNFPA Land Allocation	Primary Purpose for Treatment**
2	22	Aerial	Underburn	HRCA/Threat Zone	Wildlife[1]/Forest Health/Fuels Reduction
4	105	Aerial	As needed	HRCA/Threat Zone	Wildlife[3]/Forest Health
5	31	Aerial	As needed	HRCA	Wildlife[1]/Forest Health
6	13	Ground	As needed	HRCA	Wildlife[1]/Forest Health
7	108	Aerial	As needed	HRCA/Threat Zone	Wildlife[1]/Forest Health
9	29	Aerial	As needed	HRCA/Threat Zone	Wildlife[3]/Forest Health
10	76	Ground	As needed	HRCA/Threat Zone	Wildlife[2]/Forest Health
11	46	Ground	Hand cut and tractor pile	Defense Zone/HRCA	Fuels Reduction/ Wildlife[1]/Forest Health
14	32	Ground	Underburn	HRCA/Threat Zone	Fuels Reduction/ Wildlife[3]/Forest Health
15	53	Ground	Hand cut and tractor pile	Threat Zone	Fuels Reduction/Forest Health
16	23	Ground		Threat Zone	Forest Health
17	128	Ground	Hand cut and tractor pile	HRCA/Threat Zone	Forest Health/Fuels Reduction/Wildlife[1]
18	43	Ground	As needed	HRCA/Threat Zone	Forest Health/ Wildlife[1]
19	25	Ground	As needed	Threat Zone	Wildlife[2]/Forest Health
20	65	Ground	As needed	Defense Zone/HRCA/Threat Zone	Wildlife[2]/Forest Health
21	33	Aerial	As needed	HRCA/Threat Zone	Forest Health/ Wildlife[2]
22	40	Ground	As needed	Defense Zone/HRCA	Forest Health
23	42	Aerial	As needed	HRCA/Threat Zone	Forest Health/ Wildlife[1]
24	18	Ground	As needed	HRCA/Threat Zone	Wildlife[1]/Forest Health
25	18	Aerial	As needed	Threat Zone	Forest Health/ Wildlife[2]
26	50	Aerial	As needed	HRCA/Threat Zone	Forest Health/ Wildlife[3]
29	42	Aerial	Underburn	HRCA/Threat Zone	Wildlife[2]/Forest Health/Fuels Reduction
30	70	Aerial	As needed	Defense/HRCA/ Threat Zone	Forest Health/ Wildlife[2]
31	34	Ground	As needed	Defense Zone	Forest Health
32	61	Ground	As needed	HRCA/Threat Zone	Forest Health/ Wildlife[2,3]
33	29	Ground	As needed	General Forest	Forest Health/ Wildlife[1]
34	10	Ground	As needed	HRCA/Threat Zone	Forest Health
35	17	Ground	As needed	HRCA/Threat Zone	Forest Health
37	20	Ground	As needed	Threat/General Forest	Forest Health
38	36	Ground	As needed	General Forest	Forest Health
Totals:	**1,319**				

**** In those units showing "Fuels Reduction" as one of the primary purposes, those acres coincide with other proposed fuels treatments, as listed in Table 3.**

Wildlife[1]-oak enhancement
Wildlife[2]-pine/oak enhancement
Wildlife[3]-structural diversity

Table 1-7. Plum Proposed Plantation Thinning

Unit Designation	Estimated Unit Acres (Thinning Only)	Harvest System	Follow-Up Fuels Treatment	SNFPA Land Allocation	Primary Purpose for Treatment
0600001	21	Plantation Mastication	As needed	Threat Zone	Forest Health/Fuels Reduction
0600003	43	Mechanical Thin	Underburn	Threat Zone	Forest Health/Fuels Reduction
0600014	16	Plantation Mastication	As needed	Defense Zone/Threat Zone	Forest Health/Fuels Reduction
0600054	23	Mechanical Thin	Underburn	Defense Zone	Forest Health/Fuels Reduction
0700006	17	PCT/Hand	Underburn	Threat Zone	Forest Health/Fuels Reduction
0700051	58	Mechanical Thin	As needed	Threat Zone	Forest Health/Fuels Reduction
0700054	15	Mechanical Thin	As needed	Defense Zone	Forest Health/Fuels Reduction
0750001	143	Mechanical Thin	As needed	Threat Zone/ Old Forest/General Forest	Forest Health/Fuels Reduction
0750002	17	Mechanical Thin	As needed	Threat Zone/Old Forest	Forest Health/Fuels Reduction
0750008	4	PCT/Hand	As needed	Old Forest	Forest Health
0750010	10	PCT/Hand	As needed	Threat Zone/Old Forest	Forest Health
0750014	13	PCT/Hand	As needed	General Forest	Forest Health
0754001	83	Mechanical Thin	As needed	HRCA/General Forest	Forest Health/Fuels Reduction
1550051	20	Mechanical Thin	Underburn	Threat Zone	Forest Health/Fuels Reduction
1550054	17	Mechanical Thin	Underburn	Defense Zone	Forest Health/Fuels Reduction
Totals:	**500**				

Note: *Some of the units displayed have more than one type of treatment proposed on the unit acreage shown (i.e., Thinning / Underburning). The total treated area for all activities under this proposed action is approximately 3,050 aggregate acres.*

The following is an estimated acreage summary by proposed treatment:

Table 1-8. Plum Project Treatment Summary.

Treatment	Acres Inside Harvest Units	Acres Outside Harvest Units	Total Treatment Acres
Plantation Mastication	0	37	37
Underburning	96	1146	1242
Hand thin, machine pile and burn	197	206	403
Mechanical thinning – Ground-based	769	0	769
Mechanical thinning – Aerial	550	0	550
Mechanical thinning - Plantation	0	419	419
Precommercial thinning (chainsaw)	0	44	44
Totals	**1,612**	**1,852**	**3,464**[1]

All proposed activities would adhere to the Standards and Guidelines contained within the *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment Record of Decision* (2004). The proposed action would not foreclose options for the long-term maintenance of old forest structural elements or future complimentary fuels reduction activities not proposed under the Plum Project.

Actions Not Proposed

No timber harvest activities are proposed within delineated spotted owl or goshawk Protected Activity Centers (PACs). (Note that hand thinning of small trees (up to 9 inches dbh) and tractor piling as well as underburning is proposed in PACs within the WUI, as displayed in Table 1-5.) The use of a registered borate compound (a pesticide used to treat fungi) is proposed for use on freshly cut stumps greater than 14 inches diameter around selected high value trees, recreational areas, or in stands with healthy true fir to prevent the formation of new annosus root disease infection centers; but no other pesticides or herbicides are proposed for use within the Plum project area.

Decision to be Made

The decision to be made is whether to approve the proposed actions as presented in this document, approve an alternative to those proposed actions, or choose to not implement any of the actions proposed. All proposed actions are consistent with the *Tahoe National Forest Land and Resource Management Plan* as amended. The decision would likely be made in mid- to late 2010, and implemented in 2011 or 2012.

Chapter II – Alternatives Considered

Public Involvement/Scoping

This project was originally published in the Tahoe National Forest's quarterly *Schedule of Proposed Actions* (SOPA) in July of 2010 and every issue since that time. A public scoping letter was mailed to numerous potentially interested and/or affected individuals on July 15, 2010. A public notice was also put in Grass Valley's *The Union* Newspaper, published on July 15, 2010. Additionally, a public notice was put in Downieville's *Mountain Messenger* on the same day. As a result of this public scoping, Yuba River Ranger District received a total of nine letters of comment, plus twenty requests to be kept informed. These comments were used to identify the issues and develop the alternatives included in this Environmental Assessment.

Issues

Twenty-eight comment/keep informed letters were received and reviewed by the interdisciplinary team. The issues raised in these comment letters were separated into two groups: non-significant and significant. Significant issues are debates about the environmental effects of the proposal where such effects could be potentially intense, lasting or extensive. Issues may be considered non-significant for any of four reasons: 1) The issue is outside the scope of the proposed action; 2) The issue is already decided by law, regulation, Forest Plan, or other higher level decision; 3) The issue is irrelevant to the decision to be made; or 4) The issue is conjectural and not supported by scientific or factual evidence.

Non-significant Issues

Public scoping responses included numerous comments, questions, non-issues, and issues that were determined to be non-significant, as defined above, and are addressed in a public comment document included as Appendix B.

Significant Issues

A significant issue was identified through a number of the scoping comments received for this project proposal: The decommissioning/removal of certain roads in the project area (totaling approximately 3.26 miles) would unduly limit motor vehicle access to mining claims. A number of the routes initially proposed for removal (totaling approximately 2.29 miles) were not added to the National Forest Transportation System under the *Tahoe National Forest Motorized Travel Management Record of Decision* (2010); hence, public use of these routes is prohibited. The remainder of these routes are Maintenance Level 1 roads (approximately 0.97 miles), which are closed to motor vehicle traffic. It is possible that an authorized individual could be allowed to use these roads under an approved Plan of Operations or special use permit. Decommissioning these roads at this time would preclude such opportunities.

Although not raised as a significant issue for the Plum Project proposal, the Forest Service is required to comply with Judge England's November 4, 2009 court order for Case 2:05-cv-00205-MCE-GGH, which requires development and analysis of a non-commercial funding alternative for Forest Service projects

in Sierra Nevada national forests that include a hazardous fuels reduction objective. Alternative C, which was developed in response to this order, fully analyzes implementing only fuels reduction activities as presented in the purpose and need, and proposed action. No other actions would occur.

Alternatives

Alternative A – Proposed Action

This alternative is the Proposed Action, as presented in Chapter 1 (See pages 10-19) of this environmental assessment. Below is a summary of the project treatments.

Table 2-1. Alt. A - Plum Project Treatment Summary.

Treatment	Acres Inside Harvest Units	Acres Outside Harvest Units	Total Treatment Acres
Plantation Mastication	0	37	37
Underburning	96	1146	1242
Hand thin, machine pile and burn	197	206	403
Mechanical thinning – Ground-based	769	0	769
Mechanical thinning – Aerial	550	0	550
Mechanical thinning - Plantation	0	419	419
Precommercial thinning (chainsaw)	0	44	44
Totals	**1,612**	**1,852**	**3,464**[2]

All proposed activities would adhere to the Standards and Guidelines contained within the *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment Record of Decision* (2004). The proposed action would not foreclose options for the long-term maintenance of old forest structural elements or future complimentary fuels reduction activities not proposed under the Plum Project.

As described in Chapter 1, the land allocations within the Plum project area, as identified in the SNFPA, are: Wildland Urban Intermix (WUI) threat and defense zones, Home Range Core Areas (HRCAs), Protected Activity Centers (PACs), Old Forest, General Forest, and Inventoried Roadless Areas. While a large proportion of the treatments lie within the WUI, much of this acreage overlaps with PACs and HRCAs. Tables 1-5, 1-6, and 1-7 presented in Chapter 1, display the land allocation for each treatment unit. Proposed management activities are consistent with the applicable forest-wide and land allocation-specific standards and guidelines described in the 2004 SNFPA ROD (pp. 49 through 66). Alternative A

[2] *Some of the units displayed have more than one type of treatment proposed so the total acreage treated is less than the sum of the individual treatment acreages. The total treated area for all activities under this proposed action is approximately 3,050 aggregate acres.*

is consistent with the *Tahoe National Forest Land and Resource Management Plan* (LRMP), as amended (36 CFR 219.10 (c)).

Alternative B - (No Action)

This alternative does not implement any of actions proposed. No underburning, masticating, or fuels reduction treatments would be accomplished. No mechanical thinning would be completed. Thinning around hardwoods, creation of cover piles for wildlife, planting and precommercial thinning would not be accomplished. No wood products would be generated, nor roads decommissioned. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Under this alternative, routine land stewardship, including fire suppression, road maintenance, or other administrative activities that address threats to life and property, would continue.

This alternative complies with 40 CFR 1502.14(d), which requires that a no-action alternative be included in the analysis.

Alternative C – Noncommercial Funding Alternative

Alternative C complies with Judge England's November 4, 2009 court order for Case 2:05-cv-00205-MCE-GGH, which requires development and analysis of a Noncommercial Funding Alternative at the project level. This alternative's sole purpose is to achieve the fuels reduction element of the purpose and need, with all proposed treatments being solely directed at reducing hazardous fuels. Following are in-depth descriptions of each action planned:

- **Hand Thin and Machine Pile to Reduce Surface and Small Ladder Fuels**: On approximately 403 acres, along ridgetops, surface and ladder fuels would be reduced to less than 5 tons per acre to create opportunities for fire suppression. These actions would allow greater access and egress for local home owners and firefighting resources in the event of a large wildfire. Specific treatment actions include the thinning of trees 9 inches dbh and less by chainsaw (hand cut) followed by the piling of those and residual surface fuels by machine (bulldozer). The piles created would be burned in the fall and winter months, and an underburn of the entire unit (Units A, C-H) would occur within 5 years.

- **Underburning to Reduce Surface Fuels**: Underburning would be used on approximately 1,242 acres to remove activity generated fuels (within some of the mechanically thinned plantations) as well as naturally occurring fuels that have accumulated over time (Refer to Appendix A maps). The intention of this treatment is to reduce the surface fuel loading to levels that, when exposed to wildfire, would burn with lower fire line intensities and rates of spread. This change in fire behavior would allow safer suppression of wildfires and likely reduce them from large stand-replacing fires to smaller fires with less severe effects on vegetation, wildlife habitat, watersheds, and other forest resources.

- **Mechanical Thinning of Plantations for Fuels Reduction**: Approximately 419 acres of older pine dominated plantations are proposed for mechanical thinning. Trees within these plantations

range from 6 to 18 inches dbh. Trees removed would be less than 16 inches dbh outside the defense zone. Within the defense zone, trees removed would be less than 18 inches dbh. Thinning would reduce stand density to approximately 70 to 90 trees per acre. While the plantations would continue to be predominantly occupied by pine following thinning, healthy, vigorous conifers other than pine would be favored as leave trees. Hardwoods at least 2/3 the height of the surrounding stand would be released from conifer competition. Trees would be whole tree harvested, and the material would likely be chipped on site. Follow up underburning would reduce competition and fuels, creating a healthier residual stand.

- **Precommercial Thinning (mastication) of Plantations for Fuels Reduction**: On approximately 37 acres, plantations would be thinned using mechanical mastication to remove small trees (under 10 inches dbh) and shrubs. Objectives for mastication would be to reduce inter-tree competition, increase average crown base height, and reduce ladder fuels. The target stocking level would range from 120 to 150 trees per acre. Leave trees would favor species other than pine in these pine dominated plantations. Hardwoods would be given preference as leave trees and released from conifer competition where they are at least 2/3 the height of the surrounding conifers.

Table 2-2. Alt. C - Plum Project Proposed Fuels Treatments:

Unit Designation	Estimated Unit Acres	Proposed Treatment	SNFPA Land Allocation	Primary Purpose for Treatment
A	43	Handcut/Tractor Pile	Defense Zone	Fuels Reduction
C	67	Handcut/Tractor Pile	Threat Zone	Fuels Reduction
D	76	Handcut/Tractor Pile	HRCA/Threat Zone	Fuels Reduction
E	61	Handcut/Tractor Pile	HRCA/Threat Zone	Fuels Reduction
F	54	Handcut/Tractor Pile	PAC in Threat Zone/HRCA	Fuels Reduction
G	56	Handcut/Tractor Pile	PAC/Threat Zone	Fuels Reduction
H	46	Handcut/Tractor Pile	Defense Zone/HRCA	Fuels Reduction
I	807	Underburn	PAC/HRCA/Threat Zone	Fuels Reduction
J	435	Underburn	PAC/Defense Zone/HRCA/Threat Zone	Fuels Reduction
Totals:	**1,645**			

Table 2-3. Alt. C - Plum Project Proposed Plantation Treatments:

Unit Designation	Estimated Unit Acres (Thinning Only)	Harvest System	Follow-up Fuels Treatment	SNFPA Land Allocation	Primary Purpose for Treatment
0600001	21	Plantation Mastication	As needed	Threat Zone	Fuels Reduction
0600003	43	Mechanical Thin	Underburn	Threat Zone	Fuels Reduction
0600014	16	Plantation Mastication	As needed	Defense Zone/Threat Zone	Fuels Reduction
0600054	23	Mechanical Thin	Underburn	Defense Zone	Fuels Reduction
0700051	58	Mechanical Thin	As needed	Threat Zone	Fuels Reduction
0700054	15	Mechanical Thin	As needed	Defense Zone	Fuels Reduction
0750001	143	Mechanical Thin	As needed	Threat Zone/ Old Forest/General Forest	Fuels Reduction
0750002	17	Mechanical Thin	As needed	Threat Zone/Old Forest	Fuels Reduction
0754001	83	Mechanical Thin	As needed	HRCA/General Forest	Fuels Reduction
1550051	20	Mechanical Thin	Underburn	Threat Zone	Fuels Reduction
1550054	17	Mechanical Thin	Underburn	Defense Zone	Fuels Reduction
Totals:	**456**				

Table 2-4. Alt. C - Plum Project Treatment Summary.

Treatment	Total Treatment Acres
Plantation Mastication	37
Underburning	1,242
Hand thin, machine pile and burn	403
Mechanical thinning - Plantation	419
Totals	**2,101**[3]

Alternative C is consistent with the *Tahoe National Forest Land and Resource Management Plan* (LRMP), as amended (36 CFR 219.10 (c)).

[3] *Some of the units displayed have more than one type of treatment proposed so the total acreage treated is less than the sum of the individual treatment acreages.*

Management Requirements Common to All Action Alternatives

In response to both internal and public comments on the proposal, management requirements were developed to reduce or prevent some of the potential impacts the various proposed actions may cause. The following management requirements would be applied to Alternative A. Those management requirements applicable to the actions proposed in Alternative C would be implemented under Alternative C.

Table 2-5. Plum Project Management Requirements

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Cultural Resources - Management of Linear Features.	Directionally fell trees parallel to or away from linear features; existing breaches may be used; if necessary, new breaches would be designated by the District Archaeologist; isolated trees inside of linear features may be felled on a case-by-case basis and with on-the-ground approval of the District Archaeologist, only if removal benefits the feature.	District Archaeologist, Layout/Contract Specialist, Sale Administrator, Service Contract COR
Cultural Resources - Management of Sites.	Protect cultural resources with posted and/or flagged control areas. Utilize directional felling methods as appropriate to protect resources. Designate sites on the ground prior to work. Sale Administrator and/or Archaeologist would walk all affected sites with purchaser prior to start of felling activities.	District Archaeologist, Layout/Contract Specialist, Sale Administrator, Service Contract COR
Cultural Resources - Management of Sites.	Protect sites from adverse effects from controlled burning. The district archeologist will determine which sites can be burned over. For sites that can be burned over, fire control lines will be constructed off site and sites will not be used as staging areas or for parking vehicles and equipment.	District Archaeologist, Fuels Specialist
Cultural Resources – Felling and removal of trees within Sites.	Only hazard or wind throw trees would be removed from sites. Implement on-site tree removal only upon written approval of the Forest Cultural Resource Manager (CRM). All trees would be directionally felled and fully suspended during removal from site. Removal of trees would follow the guidelines established in the First Amended Regional Programmatic Agreement Regarding Compliance with Section 106 of the National Historic Preservation Act. An Archaeologist would be present during felling and removal of trees.	District Archaeologist, Layout/Contract Specialist, Sale Administrator

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Noxious/Invasive Exotic Weed Management – Prevention	Ensure that contract specifications include provisions that ensure all equipment used in the project area is weed free.	Botanist, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Noxious/Invasive Exotic Weed Management – Erosion control	Use only weed free plant materials for erosion control (if needed) to prevent introduction of noxious/invasive exotic weeds.	Botanist, Layout/Contract Specialist, Sale administrator, Service Contract COR
Noxious/Invasive Exotic Weed Management – Prevention	Coordinate with the botanist prior to prescribed burn operations to avoid burning known occurrences of Scotchbroom as burning could promote sprouting and spread of this nonnative plant.	Fuels specialist, Botanist
Rare Plant Management – Sensitive/ watchlist plants/plant communities	Buffer serpentine soils in Unit I by 50 feet during fuel reduction activities.	Botanist, Fuels Specialist
Rare Plant Management – Sensitive and watchlist plants/ plant communities	Buffer the *Lewisia kelloggii* ssp. *hutchisonii* occurrences by 100 feet during fuel reduction activities in Unit J.	Botanist, Fuels Specialist, Culturist, and Service Contract COR
Forest Vegetation	During harvest operations in mechanical thinning units: Where available, retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches dbh.	Silviculturist, Sale Prep Officer, and Sale Administrator.
Forest Vegetation	Apply a registered borate compound to cut conifer stumps > 14 inches dbh in order to reduce the chance of new infection centers being created through harvest activity. Borate would be applied in units 14, 23, 31, and 32. Coordinate application within 500' of spring with Aquatic Biologist	Silviculturist , Sale Administrator, Aquatic Biologist
Forest Vegetation-	Revegetate landings with native species appropriate for the site, as needed.	Silviculturist, Culturist, Wildlife Biologist, Botanist, and Range Specialist

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Forest Vegetation	As site specific conditions warrant, line (at the dripline) or rake duff and bark sluff to the dripline of large ≥ 30" dbh ponderosa and sugar pine before prescribed burning.	Silviculturist, Wildlife Biologist, and Fuels Specialist
Forest Vegetation	During mechanical operations, protect superior white fir number 8590 in unit 17 and 8601 in unit 15.	Silviculturist , Fuels Specialist, and Sale Administrator
Forest Vegetation	During harvest operations, avoid damaging hardwoods, if possible.	Silviculturist, Sale Administrator, Sale Prep Officer.
Wildlife – Northern goshawk	To protect the northern goshawk, Limit the Operating Period so that activities do not occur from February 15 through September 15 (unless surveys in the future determine that this is not necessary) in the following units: 29, 30, J.	District Biologist, Layout/Contract Specialist, Sale Administrator, Fuels Specialist, and Service Contract COR
Wildlife – California spotted owl	To protect the California spotted owl, Limit the Operating Period so that activities do not occur from March 1 through August 15 (unless surveys in the future determine that this is not necessary) in the following units: C, F, G, I, J, 30, 0600003.	District Biologist, Layout/Contract Specialist, Sale Administrator, Fuels Specialist, and Service Contract COR
Wildlife – California spotted owl	Within Units F and G that overlap the PAC-Mechanical treatments are limited to occurring within 150' of the Ridge Road.	District Biologist, Layout/Contract Specialist, Sale Administrator, Fuels Specialist, and Service Contract COR
Wildlife – California spotted owl	Underburning within Unit I: Maintain a 500-foot radius buffer around the spotted owl activity center, as identified by the wildlife biologist. Prescribed burning is allowed within the 500-foot radius buffer. Coordinate all treatments within the 500-foot buffer with a wildlife biologist. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important elements of owl habitat. SNFPA ROD (2004) – S&G No. 73, p. 60.)	District Biologist, Layout/Contract Specialist, Sale Administrator, Fuels Specialist, and Service Contract COR

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Wildlife – Springs/ Coordination	Marking of any trees for removal within 300' of the spring in Unit 32 must be coordinated with a biologist	District Biologist, Layout/Contract Specialist, Sale Administrator
Wildlife – California spotted owl & northern goshawk	To protect the California spotted owl and the northern goshawk, coordinate the location of all helicopter landings and helicopter flight paths to be sure that appropriate limited operating periods are included. Helicopter activity should generally not occur within 0.5 mile of activity centers (unless surveys determine that this is not necessary).	District Biologist, Layout/Contract Specialist and Sale Administrator
Wildlife - Bats	Report all mine openings to a wildlife biologist that are identified during project layout. Coordinate any marking of trees and all activities within 500 feet of mine openings. (Units 9, 26, and 30).	District Biologist, Layout/Contract Specialist, Sale Administrator, Prep/layout Forester, Fuels Specialist, Marking Crew Foreman.
Wildlife—Aquatics	To protect aquatic resources, maintain a 300-foot buffer around the pond in Unit 20, where no ground based activities would occur. Within the 300-foot buffer, coordinate the marking of trees for removal with a biologist. No drafting will occur from this pond.	District Biologist, District Silviculturist
Wildlife—Aquatics	To protect aquatic resources, limit the operating period within Unit 20, so that activities do not occur following the first frontal rain depositing a minimum of 0.25 inches of rain after October 15 and ends on April 15.	District Biologist, Layout/Contract Specialist, Sale Administrator, Fuels Specialist, and Service Contract COR
Wildlife – Meadow edge	To insure that wildlife objectives are met, coordinate marking within the 300-feet of meadow edges with a wildlife biologist. (in unit 30)	Silviculturist, Wildlife Biologist, Marking Crew Foreman
Wildlife - TES	If new Threatened, Endangered, or Forest Service Sensitive (TES) species are listed or discovered or nesting TES are found within 0.25 mile of activities, a limited operating period may be implemented as recommended by a qualified biologist.	District Biologist, Layout/Contract Specialist, Sale Administrator, and Service Contract COR

<table>
<tr><th>Area of Concern</th><th>Management Requirement Designed to Reduce or Prevent Undesirable Effect</th><th>Responsible Persons</th></tr>
<tr><td>Wildlife – Landing locations, Construction, and use.</td><td>Locate landings to avoid removing large trees, large snags, and large downed logs. Sale Preparation and Administration staff will coordinate with other resource specialists (botany, aquatics, wildlife, archaeology) in the placement of new landings that are outside of units or that are in addition to those that appear on the map in this Environmental Analysis.</td><td>Resource specialists, Layout/Contract Specialist, Sale administrator, and Service Contract COR</td></tr>
<tr><td>Aquatics/ Wildlife - Drafting</td><td>To protect aquatic resources, coordinate all drafting sites with the District Biologist prior to use. Use drafting devices with 2-mm or less screening device and draft from the deepest part of the pool.</td><td>Sale Admin. and Biologist</td></tr>
<tr><td>Wildlife – Coarse woody debris retention and burning</td><td>Retain as much existing coarse woody debris as possible during under burn operations, emphasizing large downed logs.</td><td>Fuels Specialist</td></tr>
<tr><td>Wildlife – Cover</td><td>Within all hand cut, tractor pile and burn units: Retain an average of 1 pile per acre, or as otherwise coordinated with: Fuels Specialist, District Biologist, District Silviculturist.</td><td>Fuels Specialist, Wildlife Biologist, District Silviculturist</td></tr>
<tr><td>Watershed, Soils, & Aquatic Resources – RCA widths</td><td>Establish Riparian Conservation Areas (RCA) for all streamcourses. Ensure RCOs are met within RCAs. Follow “RCA Guidelines” for activities within RCAs. The RCA widths are as follows:
<table>
<tr><th>Stream Type</th><th>Width of Riparian Conservation Area</th></tr>
<tr><td>Perennial Streams</td><td>300 feet each side, measured from bank full edge</td></tr>
<tr><td>Seasonal Flowing Streams</td><td>150 feet each side, measured from bank full edge</td></tr>
<tr><td>Streams In Inner Gorge</td><td>Top of inner gorge</td></tr>
<tr><td>Special Aquatic Features: Meadows, Springs & Seeps</td><td>300 feet from edge of feature or riparian vegetation, whichever is greater</td></tr>
</table></td><td>Planning Forester, Prep Forester, Sale administrator. Hydrologist, Aquatic Biologist.</td></tr>
</table>

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Watershed, Soils, & Aquatic Resources - RCAs	Vegetation and fuels management activities within the RCA is governed by the attached Riparian Conservation Area RCA Guidelines (Appendix C). These guidelines are intended to minimize the risk of sediment delivery to aquatic systems from management activities within the project area.	Hydrologist, Aquatic Biologist, Fuels Specialist, Silviculturist, Layout/Contract Specialist, Sale Administrator, and/or Service Contract COR
Watershed, Soils, & Aquatic Resources – Hazard Trees within RCAs	Fall and leave safety hazard trees within 50' or 100' "riparian buffer", unless otherwise agreed by a riparian specialist.	Hydrologist, Aquatic Biologist, Sale Administrator, and Service Contract COR
Watershed, Soils, & Aquatic Resources – Riparian Buffers	Establish a 100-foot "riparian buffer" zone along each side of perennial streams and special aquatic features, 50-foot "riparian buffer" along each side of intermittent streams and establish a 25-foot "riparian buffer" zone along each side of ephemeral streams. These zones provide for shade and coarse large woody debris (CWD) to the stream channel and adjacent land.	Planning Forester, Prep Forester, Sale Administrator
Watershed, Soils, & Aquatic Resources – Riparian buffers/burning	During prescribed fire prep and implementation, in all units with prescribed fire, to minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within the 100-foot perennial and 50-foot intermittent "riparian buffer" and special aquatic features, unless otherwise agreed by a hydrologist, soil scientist, and aquatic biologist. Fire may back into the 100-foot perennial and 50-foot intermittent "riparian buffer". No pile burning will occur within the 100-foot perennial and 50-foot intermittent "riparian buffer". Direct ignition may occur within the 25-foot ephemeral "riparian buffer".	Hydrologist, Aquatic Biologist, District Fuels Specialist, District Fire Management Officer, Soil Scientist
Watershed, Soils, & Aquatic Resources – Slope limitations for ground-based equipment.	Limit ground-based equipment (tractors and masticators) to slopes generally less than 30% outside of RCAs. Field review tractor unit boundaries by a hydrologist or soil scientist. Limit ground-based equipment to slopes less than 20% within all RCAs.	Planning and Prep Forester, Hydrologist, Soil Scientist, District Fuels Specialist.

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Watershed, Soils, & Aquatic Resources - Waterbars	Waterbar spacing: use moderate or high Erosion Hazard Rating for spacing guidelines based on site conditions and residual slash amounts. Pull berms back on skid trails where ground conditions are appropriate. Cable corridors will be hand waterbarred and mulched, if needed. Additional mulch and waterbars may be needed after underburning.	Sale Administrator, Soil Scientist, Hydrologist, District Fuels Specialist.
Watershed, Soils, & Aquatic Resources – Skid trail and cable corridor requirements	Locate skid trails at least 75 feet apart except where they converge near a landing. Trees would be directionally felled in tractor units to minimize the number of skid trails and associated ground disturbance. Use end-lining to designated skid trails. No end-lining within RCAs. In cable operations within RCAs, full suspension is required in riparian buffers and partial suspension is required outside riparian buffers.	Planning Forester, Prep Forester, Sale administrator.
Watershed, Soils, & Aquatic Resources – Riparian Buffers – Harvest/Ground Disturbance Activities	Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within Riparian Buffers.	Sale administrator, Sale Prep Forester, COR, Soil Scientist, Hydrologist, Fuels Specialist, Aquatic Biologist.
Watershed, Soils, & Aquatic Resources – Soil moisture	Allow mechanical operations only when soil moisture conditions are such that compaction, gullying, and/or rutting will be minimal. Equipment may operate on designated skid trails when soils are dry to a minimum of 4 inches. Low-ground-pressure equipment may operate off of designated skid trails when soils are dry to a depth of 4 inches. High-ground-pressure equipment may operate off of designated skid trails when soils are dry to a minimum depth of 8 inches. Off of designated skid trails, limit all equipment passes over the same piece of ground to reduce the potential for adverse soil compaction. Outside normal operating season (NOS) or during wet periods within the NOS, utilize the TNF Wet Weather Operations Guidelines.	Sale administrator, COR, Soil Scientist, Hydrologist, Fuels Specialist.

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Watershed, Soils, & Aquatic Resources – Landing construction & use	No new construction of landings in RCAs. Consult with hydrologist and aquatic biologist before using an existing landing located in a RCA.	Planning Forester, Prep Forester, Sale administrator. Hydrologist, Aquatic Biologist.
Watershed, Soils, & Aquatic Resources – Tilling roads, landings and skid trails	Deep till temporary roads (if any are used), landings, and portions of skid trails within 100' of landings. Mulch temporary road barriers with slash, wood chips or weed free straw as needed.	Planning Forester, Prep Forester, Sale administrator, Soil Scientist, Hydrologist, Silviculturist.
Watershed, Soils, & Aquatic Resources - Roads	Place rock on roads at stream crossings and segments within identified RCAs to reduce the impact of sediment delivery to associated stream courses. Place rock, slash, or certified weed-free straw at the outlets of rolling dips and/or waterbars to dissipate water where identified by road engineer and soil scientist, and/or hydrologist.	Design Engineer, Soil Scientist, Sale administrator, Hydrologist.
Watershed, Aquatic Resources, Soils, and Roads – Road Decommissioning	After all project activities have been completed, decommission identified roads by tilling and close to all vehicle traffic with log and earth or boulder and earth barriers. Mulch barriers with slash, wood chips or weed free straw as needed. Facilitate recovery by removing culverts, install waterbars, and leaving vegetated areas undisturbed as determined by the soil scientist or hydrologist. Allow to revegetate naturally.	Hydrologist, Road Maintenance Engineer
Watershed, Soils, & Aquatic Resources – Soil cover and coarse woody debris retention	In units with ground-based thinning and fuels treatment activities, maintain at least 50% effective soil cover. In units with aerial-based thinning and fuels treatment activities, maintain at least 60% effective soil cover. Retain as much existing coarse woody debris as possible during underburn operations.	Soil Scientist, Culturist, Silviculturist, and Fuels Specialist.
Watershed, Soils, & Aquatic Resources – Implementation of BMPs	To reduce the potential for adverse cumulative watershed effects, implement state certified Best Management Practices (BMPs) (USDA 2000).	Planning Forester, Prep Forester, SA. Hydrologist, Aquatic Biologist.

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Safety – Mechanical Operations	Ensure designated landing or disposal sites are of adequate size to accommodate OSHA safety requirements and the anticipated amount of residual limb and top wood that will result from Whole-Tree-Yarding within ground-based harvest system units.	Layout/Contract Specialist, Sale Administrator and Service Contract COR
Fuels Reduction – Activity Fuels Treatment	Within ground-based harvest system units, Whole-Tree-Yarding is required.	Layout/Contract Specialist, Sale Administrator and Service Contract COR
Fuels Reduction – Activity Fuels Treatment	Outside of handpile disposal strips and within aerial-based harvest system units, yard material to a 6 inch top DIB and scatter activity fuels (generated logging slash) to a depth of 18 inches.	Layout/Contract Specialist, Sale Administrator.
Transportation - System Road Maintenance	Identify Forest System Roads that are unsuitable for haul or where hauling is restricted on Sale Area Map.	Layout/Contract Specialist, Sale Administrator and Service Contract COR.
Transportation - System Road Maintenance	Maintain log haul roads before, during and after use. Maintain surface drainage structures to reduce erosion potential.	Layout/Contract Specialist, Sale Administrator and Service Contract COR.

Area of Concern	Management Requirement Designed to Reduce or Prevent Undesirable Effect	Responsible Persons
Recreation – Protection of System Trails – Plum Valley Ditch Trail, Ridge Runner Trail, High Grade Trail, Truckee Ditch Trail	**Plum Valley Ditch Trail -** Protect trail during skyline ops. (full suspension). Leave 25' buffer around trails (no cut). Repair any damaged trail sections. Close Trail during operations. Clean trail of debris. **Ridge Runner & Truckee Ditch Trails** - Protect trail from mastication equipment. Only cross trails at 90 degrees. Leave 25' buffer around trails. Repair any damaged trail sections. Close Trail during operations. Clean trail of debris. **Ridge Runner & High Grade Trails** - Protect trails during underburn preparation. Do not alter trails with, or for, fire lines. Repair any damaged trail sections. Close Trail during operations. Clean trail of debris. **Ridge Runner & High Grade Trails** - Protect trail from mastication equipment. Only cross trails at 90 degrees. Leave 25' buffer around trails. Repair any damaged trail sections. Close Trail during operations. Clean trail of debris.	Layout/Contract Specialist, Recreation Officer, Fuels Officer, Sale Administrator and Service Contract COR.

In addition to the above listed management requirements, the following BMPs to protect water quality and riparian resources, listed below, must be followed.

Best Management Practices

1.1 RESOURCE MANAGEMENT PLANNING PROCESS

The Interdisciplinary (ID) Team included a hydrologist, soil scientist, aquatic biologist, wildlife biologist, forester, fuels specialist and transportation planner who identified sensitive soils and riparian conservation areas (RCAs). They identified specific mitigation measures for these areas as documented in the following BMPs and in soil ground cover retention needs. They also evaluated soil and watershed responses to the proposed fuels reduction activities including underburning, cut/pile/burn, mastication, and biomass/thin. (ID Team - During environmental analysis process)

1.2 RESOURCE MANAGEMENT UNIT DESIGN

All resource management units are designed to secure favorable conditions of water flow and water quality by conforming to Forest Service guidelines, National Forest Management Act (NFMA) requirements, and topographic features. Consistent with equipment capabilities, units are generally bounded by roads and natural features such as ridges, minor stream channels, and riparian conservation areas (RCAs). (Planning Forester, Fuels Specialist, Hydrologist - During environmental analysis process)

1.3 USE OF EROSION HAZARD RATING (EHR) FOR RESOURCE MANAGEMENT UNIT DESIGN

An EHR was completed for all potential units using the Forest Soils Resource Inventory (SRI). For units with an overall EHR rated "high" (EHR = 13-29), mitigation measures will be applied which prevent the concentration of surface flows, such as designated skid trails or prohibition of ground-based equipment. Units with a "very high" erosion hazard rating (EHR = >30) will be reviewed by a soil scientist.

(Soil Scientist - During environmental analysis process for Preliminary EHRs; Soil Scientist, Prep Forester - During Sale Prep for Confirmation of EHRs for Certain Units, Fuels Specialist - For Prescribed Burns)

1.4 USE OF PROJECT AREA MAPS FOR DESIGNATING WATER QUALITY PROTECTION NEEDS

Project area maps will be developed during the project preparation process. These maps identify streamcourses and meadows to protect, as well as project boundaries, specified roads, road use restrictions, structural improvements to protect, fuels and vegetation management methods, water sources, and other relevant features required to implement the project. This BMP will be used for the entire area. (Planning Forester, Fuels Specialist, Project Preparation Personnel, Wildlife Biologist- During Project Prep)

1.5 LIMITING THE OPERATING PERIOD OF RESOURCE MANAGEMENT ACTIVITIES

The timing of project operations, including operating areas and erosion prevention and control, are controlled by the project implementation plan or by contract provisions requiring an operating plan and schedule. Contact provisions limiting the operating period for mechanical treatment will be added to restrict operations in units which have less than 4 inches of dry soil (BMP 5.6) or because of wet conditions. This BMP applies to all project units. (Prep Forester - During Project Prep)

1.8 RIPARIAN CONSERVATION AREA DESIGNATION

Management in Riparian Conservation Areas (RCAs) needs to be consistent with Riparian Conservation Objectives (RCOs) and Aquatic Management Strategy (AMS) goals. The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed. Projects that propose activities in RCAs need to enhance or maintain the physical and biological characteristics of the RCA.

All associated Standards and Guidelines identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) associated with this project will be adhered to.

The following are guidelines for establishing RCA widths (measured each side of stream from the apparent high-water mark or the edge of the special aquatic feature) along with equipment restrictions, vegetation management requirements, and prescribed fire requirements:

Riparian Conservation Area Widths

Widths of RCAs vary with the type of water body. The types of water bodies are designated as follows: (1) perennial streams; (2) seasonally flowing streams (includes ephemerals with defined stream channel or evidence of scour); (3) streams in inner gorge; (4) special aquatic features (lakes, meadows, bogs, fens, wetlands, vernal pools, and springs); and (5) other hydrologic or topographic depressions without a defined channel. The Sierra Nevada Forest Plan Amendment ROD defines the widths of the RCAs as follows:

Stream Type	Width of the Riparian Conservation Area
Perennial Streams	300 feet each side, measured from bank full edge
Seasonal Flowing Streams	150 feet each side, measured from bank full edge
Streams In Inner Gorge	Top of inner gorge if beyond 300 feet*
Special Aquatic Features: Meadows, Springs, and Seeps	300 feet from edge of feature or riparian vegetation, whichever is greater

*Note: If inner gorge is present and extends beyond specified RCA width, the RCA width will extend to the top of the inner gorge. The inner gorge area is defined as slopes adjacent to the stream channel greater than 70% gradient.

Other hydrologic or topographic depressions without a defined channel will be protected through standard operating procedures during unit layout through administration of the contract.

Riparian Buffers

Riparian buffers will be established within all RCAs. The purpose of the riparian buffer is to minimize impacts from management activities to the stream-adjacent zone and riparian habitat. The following are specified widths of the riparian buffer related to stream types:

Perennial Streams and Special Aquatic Features
-100 feet slope distance from the edge of the existing riparian vegetation.
Seasonal Streams (intermittent and ephemeral)
- Intermittent streams: 50 feet slope distance from the edge of the existing riparian vegetation or, if no riparian vegetation exists, from the apparent high water mark.
- Ephemeral streams: 25 feet from stream channel.

Equipment Restrictions

High-ground-pressure equipment (tractors, skidders, etc.) is limited to slopes less than 20% gradient within the RCA. New skid trails, landings or roads would not be constructed within any RCA without direct consultation with a riparian specialist. High-ground-pressure equipment is restricted to existing skid trails, landings, and roads within RCAs except to retrieve tree bundles. Consult with a riparian specialist on use of existing facilities. Within RCAs having slopes < 20% and outside of the riparian buffer, rubber-tired skidders may enter to retrieve tree bundles but are

limited to 1-2 passes over the same piece of ground. Use of skidding equipment within RCAs must be reviewed on-the-ground by a riparian specialist. Skid trails would be located outside of the RCA. Endlining within the RCA, outside of the riparian buffer must be approved prior to the activity by a riparian specialist. Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist. **Note**: to keep skid trails outside RCA during harvest operations, document on harvest cards if entering RCAs with high-ground-pressure equipment to retrieve tree bundles. Mechanical piling for fuels reduction may occur within RCAs, outside of the designated riparian buffer, when such operations do not result in detrimental soil compaction and meets the slope, soil moisture, and minimum effective soil cover (ESC) requirements.

Low-ground-pressure equipment (feller buncher, excavator, etc.) is limited to slopes less than 20% gradient within the RCA. No equipment is permitted within the riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads. Consult with a riparian specialist on use of existing facilities.

Helicopter operations may occur within the RCA outside of the identified riparian buffer. Helicopter operations within the riparian buffer may be considered on a site-specific basis after consultation with a riparian specialist.

Skyline operations may occur within the RCA when full suspension is achieved throughout the riparian buffer.

Vegetation Management Requirements

Perennial Streams and Special Aquatic Features - Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 100- foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Seasonal Streams – Within intermittent stream RCAs, unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 50-foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Within ephemeral stream RCAs, vegetation and fuels management activities using low-ground-pressure equipment may occur in the RCA on slopes < 20% gradient. No equipment is permitted within the 25-foot riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads and only after consultation with a riparian specialist. Harvest may occur within the riparian buffer if material can be fully suspended. Do not harvest trees within the stream channel or trees providing bank stability.

Prescribed Fire Requirements

Perennial Streams and Special Aquatic Features – "Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs...identify mitigation measures to minimize the spread of fire into riparian vegetation." (Sierra Nevada Forest Plan Amendment – Record of Decision, Appendix A-56). The minimum effective soil cover (ESC) requirements are identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within the riparian buffer. Fire may back into the riparian buffer. No pile burning will occur within the 100-foot riparian buffer. The riparian buffer may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain ESC, coarse large woody debris (CWD), and standing snags throughout the RCA. Short-term reduction of CWD below soil quality standards, or standards in species management plans, may occur within strategically placed treatment areas (SPLATS) or the wildland urban intermix (WUI) zone.

Seasonal Streams - The minimum effective soil cover (ESC) requirements are identified in the Forest Plan on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within a minimum 50-foot slope distance from the edge of the existing riparian vegetation of intermittent streams. Fire may back into these riparian buffers. No pile burning would occur within the respective riparian buffers. Buffers may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain CWD; however, a reduction of CWD below soil quality standards or standards in species management plans may occur within SPLATS or the urban wildland intermix zone. Within ephemeral stream RCAs, do not ignite within the stream channel. Pile burning may take place within ephemeral RCAs as long as piles are not placed within the stream channel. (Hydrologist, Planning Forester, Fuels Specialist - During environmental analysis process; Prep Forester, Fuels Specialist - During Project Prep; Fuels Specialist - During Site Preparation)

1.9 DETERMINING SLOPE LIMITATIONS FOR EQUIPMENT

Outside of RCA boundaries, tractors and other ground-based equipment will be allowed where slopes are generally less than 30 percent. Within RCA boundaries, ground-based equipment may be allowed if conditions in BMP 1.8 under "Equipment Restrictions" are met. This BMP applies to all units. (Planning Forester - During environmental analysis process; Prep Forester - During Project Prep)

1.10 TRACTOR SKIDDING DESIGN

Skid trails need to be designed to minimize the sediment yield potential of the units. Timber Sale Contract (TSC) provision C6.422 (Tractor Skidding Requirements), or the equivalent, is required on all units. The volume and velocity of runoff water will be modified to minimize erosion and sedimentation. This may involve designating and flagging skid trails, endlining, and/or falling to the lead. TSC provisions B6.42, B6.422, and C6.424, or the equivalent, will be used to control

skidding and yarding, and landing and skid trail locations. No new skid trails or roads will be constructed within RCAs without direct consultation with a riparian specialist. Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist. This BMP applies to all tractor units. (Planning Forester, Soil Scientist, Hydrologist - During environmental analysis process; Prep Forester - During Project Prep)

1.11 SUSPENDED LOG YARDING IN TIMBER HARVESTING

To protect soil from excessive disturbance and maintain integrity of the RCA, areas within the designated RCA and on slopes generally over 30 percent outside of RCAs, logs would be suspended either partially (outside of riparian buffer) or completely off the ground (inside riparian buffer). Yarding systems would include either helicopter or skyline yarders. The Timber Sale Administrator shall oversee the project operation using guidelines and standards established in the TSC, such as, TSC provisions C6.427 (Skyline Yarding) and/or C6.429 (Helicopter Yarding). This BMP applies to all skyline and helicopter units. (Planning Forester, Soil Scientist, Hydrologist - During EA Process; Prep Forester - During Sale Prep)

1.12 LOG LANDING LOCATION

Landings will be located according to TSC provision B6.422. They will be located to avoid wetlands, unstable lands, and RCAs. The cleared or excavated size of landings will not exceed that needed for safe and efficient operations. Sites will be selected which involve the least excavation and soil erosion potential. Where possible, landings will be located on or near ridges and where skidding across drainages is minimized. They will be located where sidecast will neither enter drainages nor damage other sensitive areas. Existing landings may be used within RCAs when agreed to by a riparian specialist. The BMP applies to all units. (Prep Forester - During Project Prep; Sale Administrator (SA)/Contracting Officer's Representative (COR) - During Administration of the Project)

1.13 EROSION PREVENTION AND CONTROL MEASURES DURING TIMBER SALE OPERATIONS

All erosion control work shall be completed within 15 days of completion of skidding operations relating to each landing or within 15 days of the Contract Administrator's on-the-ground designation of erosion prevention measures. The provision also requires that erosion control work be completed as promptly as possible after September 15. TSC provision B6.6 and C6.6, or the equivalent, are required in all contracts. This BMP applies to all units. (SA/COR - During Administraiton of the Project)

1.14 SPECIAL EROSION PREVENTION MEASURES ON DISTURBED LAND

The contractor shall spread slash on tractor roads, skid trails, landings or temporary road fills as provided for in TSC B6.6, C6.6, and C6.602. (SA/COR - During Administration of the Project)

1.16 LOG LANDING EROSION PREVENTION AND CONTROL

All landings will be ditched and outsloped for proper drainage according to TSC provision B6.63. Provision C6.603, or the equivalent, will be implemented to deep till as appropriate. (SA/COR - During Administration of the Project)

1.17 EROSION CONTROL ON SKID TRAILS

Erosion control measures on skid trails and temporary roads will be completed by the contractor immediately after tree removal or prior to seasonal shut down. Cross ditches, water spreading devices, or backblading shall be agreed to by the Contract Administrator. These measures shall comply with FSH 2409.15 Secs. 61.64 and 61.65 which provide guidelines for spacing cross drains, construction techniques, and cross drain angles and heights. In addition to the above, skid trails on soils with EHRs of "very high", will be stabilized according to TSC provision C6.601 or C6.602 (see BMPs 1.14 and 1.15). This BMP applies to all mechanically treated units. (SA/COR - During Administration of the Project)

1.19 STREAMCOURSE PROTECTION

Guidelines for activities within RCAs are presented in BMP 1.8 which outlines equipment restrictions, vegetation management requirements, and prescribed fire requirements. TSC provisions B6.5, B6.6, C6.427, C6.5, and C6.6, or the equivalent, will be implemented for streamcourse protection. These provisions cover proper location and methods of streamcourse crossings, equipment exclusion zones, endlining, erosion control needs near channels, and removal of material from temporary crossings. This BMP must be consistent with BMPs 1.8 and 5.3. This BMP applies to all units having a designated RCA. (SA/COR - During Administration of the Project)

1.20 EROSION CONTROL STRUCTURE MAINTENANCE

TSC provisions B4.225, B6.6, and B6.66, or the equivalent, are required to ensure that constructed erosion control structures are stabilized and working. During the period of the contract, the contractor shall provide maintenance to ensure erosion control structure stability for up to one year following their construction. The Forest Service may agree to perform such maintenance, if requested by the contractor, subject to agreement on rates. If the contractor fails to do seasonal maintenance work, the Forest Service may assume the responsibility and charge the contractor accordingly. This BMP applies to all units. (SA/COR - During Administration of the Project)

1.21 ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE

TSC provisions B6.6, B6.62, B6.63, B6.64, B6.65, B6.66, and C6.6, or the equivalent, specify erosion prevention and control measures, and maintenance of such measures, for landings, skid trails, firelines, etc. Planned erosion control work will be inspected prior to project completion to determine whether the work will be approved as adequate, if maintenance work is needed, the practicality of treatments, and the necessity for modifying standards.

Erosion control work will be approved as acceptable if there is only minor deviation from standards, provided no major or lasting damage is caused to soil or water. Erosion control work which fails to meet this criteria will not be accepted and will be redone to accepted standards. This BMP applies to all units. (SA - During Administration of the Project)

1.22 SLASH TREATMENT IN SENSITIVE AREAS

Units which include RCAs for perennial and intermittent streamcourses must meet effective soil cover goals stated in the standard and guidelines of the Forest Plan. Within sensitive areas, slash treatments would include hand pile and burn, lop and scatter, and hand pile and leave to create cover piles for small mammals. Fuels treatment within RCAs, including the use of heavy equipment, must meet effective soil cover goals in RCAs, or unit-wide (if applicable). This BMP applies to all units. (Prep Forester, Fuels Specialist - During Project Prep; SA/COR - During Administration of the Project)

1.24 NON-RECURRING C-PROVISIONS

Contract provisions will be developed as needed to ensure that adequate soil, water, or watershed values are protected as part of the project contract. (Prep Forester, Hydologist, Soil Scientist - During Planning Process; Prep Forester - during Contract Preparation)

1.25 MODIFICATION OF THE PROJECT CONTRACT

Contract provisions will be included which allow for contract modification if new circumstances indicate the project will irreversibly damage soil, water, or watershed values. The project modification can be accomplished by agreement with the contractor, or unilaterally by the Forest Service (with suitable compensation to the contractor) using an amended environmental document prepared by an ID Team. (SA/COR - During Administration of the Project)

2.7 CONTROL OF ROAD DRAINAGE

All waterbars and/or dips will be spaced to allow adequate drainage off of road surfaces and minimize water flow down roads. Outlets will be rip-rapped, if needed. (Design Engineer - During road design; ER - During Road Construction; SA/COR - During Administration of the Project)

2.12 SERVICING AND REFUELING OF EQUIPMENT

To prevent pollutants such as fuels, lubricants, and other harmful materials from being discharged into watercourses or into natural channels leading thereto, unless otherwise agreed by the hydrologist, service and refueling areas shall be located outside of RCAs. In case of a hazmat spill, the material shall be immediately contained and the Forest Service shall be immediately notified. (SA/COR, hydrologist - During Administration of the Project)

2.16 STREAMCROSSINGS ON TEMPORARY ROADS

No new specified or temporary roads would be constructed within any perennial or intermittent RCA. Temporary roads may be constructed in ephemeral RCAs, but only after consultation with a riparian specialist. Consult with a riparian specialist on use of existing roads within the RCA. This BMP applies to designated streams with RCAs. (SA/COR, hydrologist - During Administration of the Project)

2.21 WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION

Water sources will be designed to minimize streamflow fluctuation, maintain water quality and protect fish habitat while providing water for abating dust on roads during log hauling. At no time shall downstream flow be reduced to a level detrimental to aquatic resources, fish passage or

other beneficial uses as outlined in Appendix F of the TNF LRMP. Water supplies shall be developed in consultation with the hydrologist or fish biologist. Refer to TSC provision C5.451. (SA/COR, hydrologist or fish biologist - During Administration of the Project)

2.22 MAINTENANCE OF ROADS
The road system will be inspected prior to the operating season, problem areas will be identified and corrected. The Forest Service and contractor will agree on an annual Road Maintenance Plan. This BMP applies to all roads used for the project. (Operation and Maintenance (O&M) Engineer - During Administration of the Project and annually thereafter)

2.23 ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS
Road surfaces will be treated with water, MgCl, or lignin sulfonate, depending on use, soils, and availability of water. (O&M Engineer - During Product Hauling)

2.24 TRAFFIC CONTROL DURING WET PERIODS
Use on all native surface roads will be restricted to the dry season when roads are stable. A Wet Weather/Winter Operating Agreement should be agreed upon prior to operating during wet periods. (O&M Engineer - During Administration of the Project)

5.3 EQUIPMENT OPERATION RESTRICTED WITHIN RIPARIAN CONSERVATION AREAS
Fuels and vegetation management activities using high-ground-pressure equipment are restricted within RCAs. Guidelines for activities within RCAs are presented in BMP 1.8 which outlines equipment restrictions, vegetation management requirements, and prescribed fire requirements. Provisions in the contract would be implemented for RCA protection and for repair of damage due to unauthorized entry. If new streamcourses are located during the planning process, the hydrologist would be notified and would inspect locations to determine RCA widths and associated guidelines. (Hydrologist-During Project Contract Prep; SA/COR - During Administration of the Project)

5.6 SOIL MOISTURE LIMITATIONS FOR MECHANICAL EQUIPMENT OPERATIONS
Equipment activities will be allowed only when soil moisture conditions are such that compaction, gullying, and/or rutting will be minimal. In general, low-ground-pressure equipment may operate when soils are dry to a depth of 4 inches. High-ground-pressure equipment may operate on designated skid trails when soils are dry to a minimum depth of 4 inches. High-ground-pressure equipment may operate off of designated skid trails when soils are dry to a minimum depth of 8 inches. Winter operations will be allowed as long as a wet weather/winter operations agreement is agreed to prior to operations. For unclear situations, or in the event of a difference of opinion between the Forest Service Representative and Contractor's Representative, a hydrologist/soil scientist must be consulted. (Planning Forester, Soil Scientist - During environmental analysis process; SA/COR, hydrologist/soil scientist - During Administration of the Project)

6.1 FIRE AND FUEL MANAGEMENT ACTIVITIES
Fuel management activities were developed with the objective of reducing the probability that wildfires will result in catastrophic watershed damage. Catastrophic watershed damage is defined

as a watershed condition with a high probability of producing flooding, erosion that will exceed water quality standards established for identified beneficial uses, or loss of riparian vegetation that will increase stream temperatures. Most of these conditions can be avoided by reducing the intensity of wildfires and fires that are prescribed for slash treatment. (Fuels Specialist - During environmental analysis process)

6.2 CONSIDERATION OF WATER QUALITY IN FORMULATING FIRE PRESCRIPTIONS
Provide for water quality protection while achieving the management objectives through the use of prescribed fire. Prescription elements will include, but are not limited to, such factors as fire weather, slope, aspect, soil moisture, and fuel moisture. These elements influence the fire intensity and thus have a direct effect on meeting the desired ground- cover requirements. Guidelines for prescribed fire activities within RCAs are presented in BMP 1.8. Direct ignition will take place outside designated riparian buffers. Fire may back into the riparian buffers. Both the optimum and allowable limits for the burn to ensure water quality protection will be established prior to preparation of the burn plan. Effects of prescribed fire within the RCA will be assessed and mitigation measures, such as mulching or lop and scatter of existing vegetation, may be prescribed for the specific RCA. (Fuels Specialist and Riparian Specialists - During environmental analysis process and fuels treatment activities)

6.3 PROTECTION OF WATER QUALITY FROM PRESCRIBED BURNING EFFECTS
To maintain soil productivity, minimize erosion, and prevent ash, sediment, and nutrients from entering water bodies: (1) construct waterbars in fire lines; (2) burn within prescription to avoid intense fires, which may promote hydrophobicity, nutrient leaching, and erosion; (3) keep accurate records of site conditions (pre- and post-fire site condition data); (4) retain or plan for sufficient ground cover to prevent erosion of the burned site. (Fuels Specialist - During Fuels Treatment)

7.8 CUMULATIVE OFF-SITE WATERSHED EFFECTS
A cumulative watershed effects (CWE) analysis was done as part of the environmental analysis and the results are documented in the Environmental Consequences chapter of this EA. (Hydrologist - During environmental analysis process)

Comparison of Alternatives- The following charts compare the alternatives in terms of the actions they propose as well as their potential environmental consequences.

Acres and Treatment by Unit Charts:

Table 2-6. Plum Project Fuels Treatments Summary.

Unit Number	Estimated Unit Acres – Alt A	Estimated Unit Acres – Alt B	Estimated Unit Acres – Alt C	Proposed Treatment	SNFPA Land Allocation	Primary Purpose for Treatment
A	43	0	43	Handcut/ Tractor Pile	Defense Zone	Fuels Reduction
C	67	0	67	Handcut/ Tractor Pile	Threat Zone	Fuels Reduction

D	76	0	76	Handcut/ Tractor Pile	HRCA/Threat Zone	Fuels Reduction
E	61	0	61	Handcut/ Tractor Pile	HRCA/Threat Zone	Fuels Reduction
F	54	0	54	Handcut/ Tractor Pile	PAC in Threat Zone/HRCA	Fuels Reduction
G	56	0	56	Handcut/ Tractor Pile	PAC/Threat Zone	Fuels Reduction
H	46	0	46	Handcut/ Tractor Pile	Defense Zone/HRCA	Fuels Reduction
I	807	0	807	Underburn	PAC/HRCA/ Threat Zone	Fuels Reduction
J	435	0	435	Underburn	PAC/Defense Zone/HRCA/ Threat Zone	Fuels Reduction
Total	**1,645**	**0**	**1,645**			

Table 2-7. Plum Project Mechanical Thinning Treatments Summary.

Unit Number	Estimated Unit Acres (Thinning Only)- Alt. A	Estimated Unit Acres (Thinning Only)- Alt. B	Estimated Unit Acres (Thinning Only)- Alt. C	Proposed Harvest System	SNFPA Land Allocation	Primary Purpose for Treatment
2	22	0	0	Aerial	HRCA/ Threat Zone	Wildlife[1]/Forest Health/Fuels Reduction
4	105	0	0	Aerial	HRCA/ Threat Zone	Wildlife[3]/Forest Health
5	31	0	0	Aerial	HRCA	Wildlife[1]/Forest Health
6	13	0	0	Ground	HRCA	Wildlife[1]/Forest Health
7	108	0	0	Aerial	HRCA/ Threat Zone	Wildlife[1]/Forest Health
9	29	0	0	Aerial	HRCA/ Threat Zone	Wildlife[3]/Forest Health
10	76	0	0	Ground	HRCA/ Threat Zone	Wildlife[2]/Forest Health
11	46	0	0	Ground	Defense Zone/ HRCA	Fuels Reduction/ Wildlife[1]/Forest Health
14	32	0	0	Ground	HRCA/ Threat Zone	Fuels Reduction/ Wildlife[3]/Forest Health
15	53	0	0	Ground	Threat Zone	Fuels Reduction/Forest Health
16	23	0	0	Ground	Threat Zone	Forest Health
17	128	0	0	Ground	HRCA/ Threat Zone	Forest Health/Fuels Reduction/Wildlife[1]
18	43	0	0	Ground	HRCA/ Threat Zone	Forest Health/ Wildlife[1]
19	25	0	0	Ground	Threat Zone	Wildlife[2]/Forest Health
20	65	0	0	Ground	Defense Zone/ HRCA/ Threat Zone	Fuels Reduction/ Wildlife[2]/Forest Health
21	33	0	0	Aerial	HRCA/ Threat Zone	Forest Health/ Wildlife[2]
22	40	0	0	Ground	Defense Zone/HRCA	Fuels Reduction/Forest Health

23	42	0	0	Aerial	HRCA/ Threat Zone	Forest Health/ Wildlife[1]
24	18	0	0	Ground	HRCA/ Threat Zone	Wildlife[1]/Forest Health
25	18	0	0	Aerial	Threat Zone	Forest Health/ Wildlife[2]
26	50	0	0	Aerial	HRCA/ Threat Zone	Forest Health/ Wildlife[3]
29	42	0	0	Aerial	HRCA/ Threat Zone	Wildlife[2]/Forest Health/Fuels Reduction
30	70	0	0	Aerial	Defense/HRCA/ Threat Zone	Forest Health/ Wildlife[2]
31	34	0	0	Ground	Defense Zone	Forest Health/Fuels Reduction
32	61	0	0	Ground	HRCA/ Threat Zone	Forest Health/ Wildlife[2,3]
33	29	0	0	Ground	General Forest	Forest Health/ Wildlife[1]
34	10	0	0	Ground	HRCA/ Threat Zone	Forest Health
35	17	0	0	Ground	HRCA/ Threat Zone	Forest Health
37	20	0	0	Ground	Threat/ General Forest	Forest Health
38	36	0	0	Ground	General Forest	Forest Health
Total	**1,319**	**0**	**0**			

Wildlife[1]-oak enhancement
Wildlife[2]-pine enhancement
Wildlife[3]-structural diversity

Table 2-8. Plum Project Plantation Thinning Summary.

Unit Number	Estimated Unit Acres (Thinning Only)- Alt. A	Estimated Unit Acres (Thinning Only)- Alt. B	Estimated Unit Acres (Thinning Only)- Alt. C	Harvest System	SNFPA Land Allocation	Primary Purpose for Treatment
0600001	21	0	21	Plantation Mastication	Threat Zone	Forest Health/Fuels Reduction
0600003	43	0	43	Mechanical Thin	Threat Zone	Forest Health/Fuels Reduction
0600014	16	0	16	Plantation Mastication	Defense Zone/ Threat Zone	Forest Health/Fuels Reduction
0600054	23	0	23	Mechanical Thin	Defense Zone	Forest Health/Fuels Reduction
0700006	17	0	0	PCT/Hand	Threat Zone	Forest Health/Fuels Reduction
0700051	58	0	58	Mechanical Thin	Threat Zone	Forest Health/Fuels Reduction
0700054	15	0	15	Mechanical Thin	Defense Zone	Forest Health/Fuels Reduction
0750001	143	0	143	Mechanical Thin	Threat Zone/ Old Forest/ General Forest	Forest Health/Fuels Reduction
0750002	17	0	17	Mechanical Thin	Threat Zone/Old Forest	Forest Health/Fuels Reduction
0750008	4	0	0	PCT/Hand	Old Forest	Forest Health
0750010	10	0	0	PCT/Hand	Threat Zone/Old Forest	Forest Health
0750014	13	0	0	PCT/Hand	General Forest	Forest Health
0754001	83	0	83	Mechanical Thin	HRCA/ General Forest	Forest Health/Fuels Reduction
1550051	20	0	20	Mechanical Thin	Threat Zone	Forest Health/Fuels Reduction
1550054	17	0	17	Mechanical Thin	Defense Zone	Forest Health/Fuels Reduction
Totals:	**500**	**0**	**456**			

Table 2-9. Plum Project Attributes Comparison Chart:

Attribute Compared	Alternative A- (Proposed Action)	Alternative B- (No Action)	Alternative C- (Noncommercial Funding Alternative)
Acres of reduced fuels, by treatment type.			
Underburn:	1,242 acres	None	1,242 acres
Plantation Mastication:	37 acres	None	37 acres
Hand Thin/Machine Pile/Burn:	403 acres	None	403 acres
Mechanical Thin (Plantation**):**	419 acres	None	419 acres
Mechanical Thin (Ground-based):	769 acres	None	0 acres
Mechanical Thin (Aerial):	550 acres	None	0 acres
Precommercial Thin:	44 acres	None	0 acres
(****Note**: Some acres overlap, therefore, totals do not match cumulative column totals; and all acres are approximate)			
Total Acres:	**3,464 Acres****	**None**	**2,101 Acres****
Acres of treatments in developed areas within the Urban Wildland Intermix Zone (Defense or Threat).	Approximately 3,187 acres treated in WUI.	No treatments would be accomplished.	Approximately 1,955 acres treated in WUI.

Attribute Compared	Alternative A- (Proposed Action)	Alternative B- (No Action)	Alternative C- (Noncommercial Funding Alternative)
Minimum post-harvest canopy closure on mechanically thinned acres (outside defense zones).	50% minimum.	Existing.	N/A
Mechanical Thinning Treatments designed to incorporate recommendations in GTR 220 (USDA- FS-PSW General Technical Report – "An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests"	1,738 acres	None.	419 acres
Miles of Roads planned for closing/ gating/ decommissioning.	7.23 miles	None	None
Improvement of Forest and Watershed Health	Yes	No	Yes, but as an ancillary effect associated with reducing hazardous fuels, and to a substantially lower degree than Alt. A
Amount of Timber harvested.	11 mmbf	None	None

****Note**: All acres are approximate.

Table 2-10. Plum Project Treatment Comparison Chart.

Action Proposed	Alternative A- (Proposed Action)	Alternative B- (No Action)	Alternative C- (Noncommercial Funding Alternative)
Hand thin/machine pile/burn	403 acres	None	403 acres
Plantation Mastication	37 acres	None	37 acres
Mechanical Thin - Plantations	419 acres	None	419 acres
Underburning	1,242 acres	None	1.242 acres
Mechanical Thin/ground-based equipment	769 acres	None	None
Mechanical Thin/aerial-based equipment	550 acres	None	None
Precommercial Thinning (Chainsaw)	44 acres	None	None
Enhancement of hardwoods (Oaks)	Yes	None	None
Improve cover for smaller animals and prey species	160 acres	None	None
Treat cut stumps with borate compound	Yes	No	No
Offer sawtimber and biomass material	Yes	No	No
ID and remove hazardous trees along roads within units	Yes	No	No
Repair specified roads	6.02 miles	None	None
Close or decommission unnecessary roads	7.23 miles	None	None

****Note**: All acres are approximate.

Table 2-11. Plum Project Comparison of Potential Environmental Impacts by Alternative

Resources of Interest	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C (Non-Commercial Funding)
Cumulative Watershed Effects	4 watersheds at moderate risk of adverse cumulative watershed effects and 3 watersheds at low risk.	2 watersheds at moderate risk of adverse cumulative watershed effects and 5 watersheds at low risk.	2 watersheds at moderate risk of adverse cumulative watershed effects and 5 watersheds at low risk.
Perennial and Intermittent Riparian Conservation Areas (RCAs) Affected by Ground-Based Mechanical Commercial Thinning and Biomass Thinning	Ground-based mechanical commercial thinning operations proposed on 14 acres within RCAs and 28 acres within RCAs for ground-based biomass thinning	No ground-based mechanical thinning operations proposed in RCAs	No ground-based mechanical commercial thinning operations proposed within RCAs and 28 acres within RCAs for ground-based biomass thinning
Percentage of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire	40% reduction in Timber Harvest Units, 27% reduction in Fuels Only Units	No mechanical thinning proposed	No reduction in Timber Harvest Units, 27% reduction in Fuels Only Units
Percent of acres potentially producing rates of spread greater than 40 ch/hr in the event of a wildfire	30% reduction in Timber Harvest Units, no reduction in Fuels Only Units in 0-20 ch/hr	No mechanical thinning proposed	No reduction in 0-20 ch/hr in all stands
Percent of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec in the event of a wildfire	40% reduction in Timber Harvest Units, 27% reduction in Fuels Only Units	No mechanical thinning proposed	No reduction in Timber Harvest Units, 27% reduction in Fuels Only Units
Forest Health – acres meeting SDI goals post-treatment	564 acres	0 acres	128 acres[4]
Habitat Affected for Old Forest Associated Species	Mechanical thin: 1,465 acres; Cut, pile and burn: 180 acres; Underburn: 677 acres	0	Cut, pile and burn: 180 acres, Underburn: 677 acres

[4] While forest health objectives are not included in the non-commercial funding alternative, meeting SDI goals in some treated areas would be ancillary benefits associated with reducing hazardous fuels under Alternative C.

Resources of Interest	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C (Non-Commercial Funding)
Habitat removed for old-forest-associated species	0	0	0
Canopy Cover Reduced Below 50%	34 acres	0	0
Canopy cover reduced in mid-seral forests that results in net change in CWHR type (CWHR 4D changed to 4M due to reduction in canopy cover)	490 ac (canopy returns to $\geq$ pre-treatment levels in all 490 acres within 10 years)	0	0
Hardwood Enhancement	615 acres	0	0
Soil Compaction	Detrimental compaction limited in degree and extent, primarily on landings and heavily used tractor skid trails	No new detrimental compaction	Detrimental compaction limited in degree and extent, primarily within tractor pile and biomass thin areas

Chapter III – Environmental Consequences

This chapter discloses the potential consequences or impacts of the alternatives described in Chapter II. Chapter III provides the scientific and analytical basis for the comparison of the environmental consequences of the alternatives summarized in Chapter II.

This chapter discusses the consequences by resource area (i.e., botany, fisheries, fuels, vegetation, wildlife, etc) as needed, that are relevant to the identified issues of significance, as well as the elements of the finding of no significant impact (FONSI). This chapter displays a comparison of the consequences, and provides brief, yet sufficient, evidence and analysis to determine whether to prepare an environmental impact statement or a finding of no significant impact. The specialist's reports, mentioned and/or incorporated by reference in this document, contain detailed analysis of the consequences by alternatives. They are located in the project file and are available upon request.

Effects relative to significant issues

This section describes the effects of the alternatives in relation to significant issues. There was one significant issue identified through scoping comments for this project: the potential adverse effects on access to mining claims associated with decommissioning/closing of specific roads in the project area.

The proposed action (Alternative A) responds to the need to improve forest health, watershed health, and wildlife habitat, and to reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the event of a wildfire, consistent with management direction in *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment* (2004). It also addresses the issue of decommissioning roads within the project area through an incremental change to the proposed action (See Chapter I, Table 1-4, pg. 14).

Alternative B is the No Action alternative. This alternative does not implement any of the actions proposed. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Alternative C was developed in response to Judge England's November 4, 2009 court order for Case 2:05-cv-00205-MCE-GGH, which requires analysis of a non-commercial funding alternative for Forest Service projects that include a hazardous fuels reduction objective. Alternative C fully analyzes implementing only fuels reduction activities as presented in the purpose and need, and proposed action. No other actions would occur.

Effects relative to Finding of No Significance Impact (FONSI) elements.

In 1978, the Council on Environmental Quality published regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CFR Parts 1500-1508) included a definition of "significant" as used in NEPA. The eleven elements of this definition are critical to reducing paperwork through use of a finding of no significant impact (FONSI) when an action would not have a significant effect on the human environment, and is therefore exempt from requirements to prepare an

environmental impact statement (EIS). Significance as used in NEPA requires considerations of context and the ten elements of intensity as follows:

(a) Context: Significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, affected interests, and the locality. Significance varies with setting. In the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

The context of the proposed action is limited to minor, local, short-term effects within the area. No significant effects, either long or short term, regional or societal, are anticipated.

The local context of the proposed action is limited to the northwestern portion of the Tahoe National Forest, in locations shown on the attached maps (See Appendix A). The TNF is comprised of approximately 800,000 acres of national forest land. This project's area represents less than one percent of the total Forest landbase. Project activities would occur over a relatively short time period, with the mechanized portion of the harvest activities, in all probability, limited to a three year contract. Other project activities would, most likely, all be completed within five to seven years of the decision. Also, all these tasks are done seasonally, not year-round. Thus, in terms of the affected area, the proposed action affects a very small portion of the landbase over a relatively short timeframe. Even in the context of seasonality and duration of activities, analyses prepared for this EA (Biological Evaluations, Management Indicator Species Assessment, Weed Risk Assessment, Cumulative Watershed Effects Analysis, Riparian Conservation Objectives analysis, Riparian Conservation Area guidelines, fuels report, silvicultural report, and the soils analysis, hereby incorporated by reference, and available on request) indicate that the proposed action would not pose significant short- or long-term effects on forest resources.

(b) Intensity: Refers to the severity of impact, ... and the following should be considered in evaluating intensity:

1. Impacts both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Effects determinations are summarized in supporting analysis documents and/or in the remaining sections of this chapter. All analyses prepared in support of this document considered both beneficial and adverse effects, but all effects determinations were made on the basis of only adverse effects. The effects are discussed below.

Hydrology:

The information provided in this section is summarized from the Hydrology Report prepared for the Plum Project, which is hereby incorporated by reference. The complete Hydrology Report is available in the Plum Project Record.

Forest management activities have the potential to affect hydrologic resources by causing soil disturbance, altering vegetative cover, and changing local drainage patterns. The effects of the proposed management activities are most closely related to the forest health and fuel reduction

techniques used. Ground-based mechanical systems have the highest potential impacts. Applying the Forest Plan Standards and Guidelines and effective Best Management Practices (BMPs) for Protecting Water Quality would reduce the magnitude of the effects on water resources. In addition, management requirements are included in the action alternatives to avoid sensitive watershed areas or minimize potential adverse impacts on water resources. The primary concern to water quality is the impairment of beneficial uses due to an increase of fine sediment caused by accelerated erosion from the proposed project activities. The risk of direct effects on water quality would be low, because project design and management requirements would minimize the impacts of project activities on water resources.

Effectiveness of the BMPs in mitigating direct and indirect effects on water quality is largely related to proper implementation and the magnitude of climatic events the first several seasons after project completion. There is a risk that heavy precipitation or rain on accumulations of snow could overwhelm erosion control structures and render them ineffective. The increased sediment delivery to channels would occur only during rare events and for short periods of time where overland flow from disturbed areas occurs. BMPs have been selected using specific information regarding soil, slope, geology, and climate conditions typically found in the Plum project area.

Mechanical Thinning with Ground Based Equipment and Aerial Equipment, including the removal of roadside hazard trees within unit boundaries. (Alternatives A and C)

Erosion, sediment and water quality

Mechanical thinning involves the use of mechanical, ground-based equipment, and aerial-based equipment (including skyline yarding systems and helicopters). Alternative A proposes approximately 1,738 acres of mechanical thinning (1,188 acres of ground-based and 550 acres of aerial based) while Alternative C proposes approximately 419 acres of mechanical thinning, all of which would be ground-based. Alternative B proposes no mechanical thinning.

Mechanical thinning with ground-based equipment would be conducted on slopes generally less than 30 percent with chainsaws and/or mechanical harvesters. Short pitches less than 150 feet long and up to 35 percent in slope would also be included. Mechanical thinning with aerial equipment would be conducted on slopes generally greater than 25 percent. Trees would be felled within aerial units using chainsaws. The potential direct effects of aerial-based thinning on soils include reduction in soil cover when logs are yarded, mainly within the skyline corridors, and soil compaction on landings and associated temporary roads. The potential direct effects of mechanical, ground-based equipment on soils include a reduction in soil cover; an increase in compaction due to the building of new and the reopening of existing, temporary roads, skid trails, and landings; and soil displacement during skidding operations. The potential direct effects of the thinning on hydrology and water quality would depend on how much ground is detrimentally compacted, how much soil cover is removed, steepness of the treated slopes, and the proximity to stream channels.

The use of a feller-buncher/skidder logging system would result in the short-term reduction of ground cover on the skid trails and landings. The residual tree canopy would quickly deposit needle/leaf material providing beneficial ground cover. Compaction would be reduced by placing skid trails a minimum of 75 feet apart, operating when soils are dry, and subsoiling after operations

are complete. Ground-based equipment would be operating on slopes with a gradient of generally less than 30%. The slope limitations for each unit were determined based on soil erosion hazard rating, topography, and proximity to streams. There should be minimal alteration of drainage patterns, because runoff would be dispersed by implementation of effective erosion control structures on roads, skid trails, and landings. The ground based thinning operations as proposed under Alternatives A and C should have little direct effects on water quality and/or quantity or flow regime.

The potential indirect effects of ground-based thinning operations on water resources include increased risk of soil erosion and subsequent sediment delivery to streams. Isolated removal of soil cover and increased compaction can result in greater overland flow caused by reduction in infiltration and soil water storage. The ground-based thinning operation has the potential to indirectly affect hydrology and water quality by increasing water yields, peak flows, and the timing of runoff by compacting forest soil and decreasing transpiration. The amount of cover removed through ground-based thinning operations should not increase the risk of erosion. Maintaining slash on skid trails and implementing effective erosion control structures would reduce erosion from compacted skid trails. The thinning operation as proposed, both ground-based and aerial-based, should result in a minimal increase in the risk of erosion. The treatment prescriptions as proposed would not create large openings and would not remove the amount of basal area necessary to generate increases in water yield or peak flow. The hydrologic effects in mechanically thinned areas are expected to be minimal. The effects of compaction on water yield should be minimal when management recommendations are combined with falling to the lead wherever possible. Tops and branches that are left in the woods in the aerial-based harvest areas would be distributed over the landscape and decrease overland flow of water. Grass, shrubs, and herbaceous ground cover would quickly establish or reoccupy harvested areas. Remaining canopy cover and expected revegetation would aid in reestablishing infiltration rates. Roots of residual and newly established vegetation would hold soil masses together and provide for erosion control.

The direct and indirect effects of constructing temporary roads would be the removal of the topsoil layer and compaction of the road surface. This could increase and redistribute the surface drainage and has the potential to increase erosion and sediment delivery to streams downhill of the road. Road cuts have the potential to affect hydrologic function by disrupting and increasing the surface drainage and by interrupting the subsurface water flow; however, mitigation measures (described in Chapter II) would be implemented to minimize the potential for these types of effects. The effects of temporary roads would decrease after subsoiling and closing the road.

Near stream soil disturbance

Riparian Conservation Areas (RCAs) have been established on all streams within the project area to protect the aquatic and riparian ecosystems. The following RCA widths have been established for the Plum project area: perennial streams – 300 feet, seasonal streams, including intermittent and ephemeral streams – 150 feet, and Special Aquatic Features such as springs/seeps and ponds – 300 feet. Within the RCA, a riparian buffer would be established according to the "Plum RCA Guidelines" where harvest would not be conducted except for safety considerations or the benefit to riparian dependant species.

There are 8,093 acres of perennial and intermittent RCAs in the seven 7th field HUC watersheds potentially impacted by this project. Under Alternative A, ground-based activities proposed on 22 acres of the perennial and intermittent RCAs (<1 percent of perennial and intermittent RCAs). Under Alternative C, ground-based activities are proposed on 8 acres of the project's perennial and intermittent RCAs. There are no acres proposed for aerial-based activities in Alternative C. Alternative A proposes aerial-based activities on 53 acres of the perennial and intermittent RCAs (<1 percent of perennial and intermittent RCAs). Generally, the proposed activities would take place on the outer edges of the RCAs, away from streams.

Given that only 22 acres within RCAs are proposed for ground-based thinning and 53 acres for aerial thinning (40 acres skyline and 13 acres helicopter), the proposed thinning activities under Alternative A have the potential to impact less than 1 percent of the total perennial and intermittent RCAs within the analysis area. Under Alternative C, only 8 acres are proposed for ground-based thinning activities and have the potential to impact less than 1 percent of the total perennial and intermittent RCAs within the analysis area.

Hand thinning and machine piling and burning of the piles. (Alternatives A and C)

Erosion, sediment and water quality

Under Alternatives A and C, hand thinning, tractor piling, and pile burning would be conducted on approximately 403 acres on slopes generally less than 25 percent. Hand thinning and tractor piling would be used to reduce activity generated and natural fuels that exceeded the loading that could be underburned safely. Hand thinning of conifers less than 10 inches dbh to approximately 20 foot spacing and cutting of brush would be followed by material piled with a tractor, lined, and then burned the following winter.

Hand thinning, tractor piling and pile burning could have potential indirect hydrologic effects. The greatest risk to hydrologic resources can occur if pile burning exposes bare mineral soils over large areas. Water quality can be indirectly affected if soil erosion and subsequent sediment delivery to streams occurs. However, as discussed in the soil productivity analysis in this chapter, burning prescriptions would be designed to avoid excessive soil heating and adverse effects on soil organic matter. Fuels reduction through hand cut/tractor pile/burn would result in some exposed bare mineral soil where concentrations of fuels were burned, with a possible hydrophobic layer under the burn piles. However, no less than a minimum of 50 percent effective soil cover would be retained across the treated areas to minimize potential erosion and subsequent stream sedimentation.

Near stream soil disturbance

There are 3 acres of proposed hand thinning, tractor piling, and pile burning within intermittent RCAs adjacent to unnamed tributary to Kanaka Creek. The proposed tractor pile and burn activities would follow the Plum Riparian Conservation Area (RCA) Guidelines for "Equipment Restrictions" and "Prescribed Fire Requirements" while meeting the Forest Plan soil cover requirements. Implementation of the hand thinning, tractor piling, and pile burning activities proposed under Alternatives A and C would not result in near stream soil disturbance.

Underburning. (Alternatives A and C)

Erosion, sediment and water quality

The greatest risk to hydrologic resources can occur if underburning exposes large areas of bare mineral soils, potentially increasing soil erosion and subsequent stream sedimentation. As disclosed in the soil productivity analysis in this Chapter, while underburning would temporarily reduce soil cover, the burning prescriptions would be designed to ensure the retention of 50 percent effective soil cover and would meet LRMP standards for organic matter. Retaining soil cover and reducing the potential for soil erosion would reduce the potential for stream sedimentation as a result of the approximately 1,242 acres of underburning proposed under Alternatives A and C.

Near stream soil disturbance

There are 130 acres of proposed underburning within the perennial and intermittent RCAs are adjacent to Oregon Creek and Kimberley Creek and unnamed tributaries to Kimberley and Kanaka Creek. The proposed underburn activities would follow the Plum Riparian Conservation Area (RCA) Guidelines for "Prescribed Fire Requirements" while meeting the Forest Plan soil cover requirements. Implementation of these measures would ensure that underburning within these RCAs would not directly or indirectly affect soils near streams.

Precommercial thinning (chainsaw) of plantations. (Alternative A)

Erosion, sediment and water quality

Alternative A proposes precommercial thinning on approximately 44 acres, which would involves hand cutting and lop and scattering or chipping trees less than 10 inch DBH. This treatment involves hand work without the use of ground disturbing equipment and therefore would not detrimentally affect erosion, sediment, or water quality. The precommercial thinning would add effective soil cover through lop and scattering or chipping slash.

Alternatives B and C do not propose precommercial thinning.

Near stream soil disturbance

There are 4 acres of proposed precommerical chainsaw thinning under Alternative A within the perennial RCA of the headwaters of the South Fork Kanaka Creek. These activities would have low potential to result in near stream soil disturbance when management requirements, Plum Riparian Conservation Area (RCA) Guidelines, and BMPs are implemented.

Precommercial thinning (mastication) of plantations. (Alternatives A and C)

Erosion, sediment and water quality

Mechanical mastication to improve the health of plantations on 37 acres proposed under Alternatives A and C involves the use of low-ground-pressure (<8 psi) equipment. The direct and indirect effects to the soil and water resources are less than that of the mechanical thinning operation since no skidding of material is involved. Temporary roads and landings would not be needed in this operation. Ground-based equipment is used in the mastication operation and therefore potential short-term impacts to soil and water are present. The equipment, however, operates primarily on a self-generated bed of slash. The increased material left on-site after the mastication operation benefits soil by providing soil cover and mulch while reducing evaporation. Management requirements to protect soils and water that apply to mechanical thinning operations (see Chapter II of this EA) would also apply to the mastication operations. Mastication of small conifers and shrubs under Alternatives A and C would not adversely affect water quality.

Near stream soil disturbance

There are no RCAs associated with the two mastication units in the proposed Plum project and therefore no near stream soil disturbance.

Oak Enhancement. (Alternative A)

Erosion, sediment and water quality

The oak enhancement treatment would take place within mechanical thinning units, both ground-based and aerial harvest systems. The direct and indirect effects from cutting smaller diameter (< 10" dbh), non merchantable conifers would be the same as discussed above under the heading "Mechanical Thinning with Ground Based Equipment and Aerial Equipment." Slash generated by cutting smaller diameter conifers would be either removed during follow-up underburning treatments or lopped and scattered and left in place. Oak enhancement proposed under Alternative A would not result in erosion or adversely affect water quality.

Near stream soil disturbance

There are 21 acres of proposed oak enhancement chainsaw thinning within the perennial RCA of Kimberley Creek and within the intermittent RCA of an unnamed tributary to Rapps Ravine. The smaller diameter trees would be cut using chainsaws since the area is located within an aerial harvest unit. These activities would have little direct or indirect effects on water resources when management requirements, Plum Riparian Conservation Area (RCA) Guidelines, and BMPs are implemented.

Decommissioning, closing, or gating specified roads and maintaining/repairing specific roads. (Alternative A)

Erosion, sediment and water quality

It is a well documented fact that road related erosion is a primary source of accelerated erosion in forests throughout the western United States (Kattleman 1996). Road erosion rates are typically much greater than hillslope erosion rates and are highly variable, dependent on factors such as percent hillslope, location on slope, parent material, and years since construction or maintenance. Maintenance and repair of the current road system includes clearing roadside brush and debris, surface grading, rocking identified sections of roads within RCAs, and installation of drivable waterbars and/or dips. These improvements would have both direct and indirect benefits to the stream system by reducing erosion and sediment coming from the road system and its effects on downstream flow. Decommissioning or closure of unnecessary Forest Service or temporary roads would achieve several objectives through the road decommissioning process. Primary objectives include erosion control and restoration of the hillslope hydrology. Secondary objectives include protection of aquatic habitat, enhance growth of pre-existing native plant communities, and wildlife habitat protection and enhancement. The decommissioned roads would be restored by use of a tractor with winged rippers and in some cases the use of a tractor and excavator. The tractor with winged rippers is used to break up the compacted road surface. Erosion control devices (waterbars) and in some cases mulch would be deposited on the road surface to minimize erosion. The entrance to the road would be blocked by construction of double earthen barriers to prevent future use. The project is designed to promote natural recovery of the road surface by restoring the natural hydrologic function (infiltration capacity) of the soil in the roadbed, reducing runoff and erosion. This operation does not involve complete obliteration of the road. The road prism is still intact along with any cut and fills. If the road is needed at a later time, the road could be used but would need clearing and grading to facilitate use.

Near stream soil disturbance

These above activities would have little potential to disturb near stream soils when management requirements, Plum Riparian Conservation Area (RCA) Guidelines, and BMPs are implemented. Removal of unnecessary Forest Service or temporary roads would have both direct and indirect benefits to the stream system by reducing erosion and sediment coming from the road system and its effects on downstream beneficial uses. Identified roads would be closed after use to vehicular traffic by waterbarring the road surface and placing log/earth barriers at the entrance to reduce erosion and sediment sources and promote vegetative growth on previously compacted surfaces.

Direct and Indirect Effects of Alternative B

Erosion, sediment and water quality

Under Alternative B, existing conditions in the four HUC7 drainages in the Plum Project area would continue to proceed through natural processes. Natural processes include: hill slope erosion and

stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. Alternative B would have both positive and negative impacts on watershed conditions. The No Action Alternative would also preclude opportunities that may benefit watershed resources, such as, thinning overstocked stands of trees, restore aspen stands, reduce fuels accumulation by underburning and mastication, and improving portions of the road system that are currently delivering sediment to the stream system.

A positive outcome of the No Action Alternative is that no short-term ground disturbance would occur, thus reducing the potential for temporary increased sediment transport to streams, loss of soil cover, or degradation of riparian or aquatic habitats associated with land management activities.

Soil Productivity:

The information provided in this section is summarized from the Soils Report prepared for the Plum Project (January 2011), which is hereby incorporated by reference. The complete Soils Report is available in the Plum Project Record.

The Tahoe National Forest Land and Resource Management Plan (LRMP 1990), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA 2004), provides direction for maintaining long-term soil productivity through standards and guidelines for three soil characteristics: soil porosity, soil cover, and soil organic matter (LRMP, pages V-36 through V-38). Existing soil conditions as well as direct and indirect effects of the alternatives on the three soil characteristics are addressed here.

Analysis of direct and indirect effects on soil productivity is bounded by the proposed activity areas within each alternative. "An activity area is the area on which a soil-impacting activity has occurred or is planned. An activity area includes temporary roads, landings, skid roads and skid trails; system roads are not included" (LRMP, page V-36).

Soil Cover (Erosion)

The Pacific Southwest Region (R5) Soil Erosion Hazard Rating (EHR) System is used to rate the risk of soil erosion for all soils within the proposed activity areas (areas where soil disturbing activities are proposed). This system uses various physical soil properties, along with climate and site-specific conditions, to rate soils for hazard of sheet and rill erosion. This system can also be used to determine the amount of surface cover necessary post-activity to avoid raising the erosion hazard rating.

Currently all proposed activity areas have a low risk of erosion. All activity areas reviewed had sufficient ground cover to prevent soil loss from erosion. No active erosion or sediment movement was observed on any proposed activity areas surveyed that would indicate a loss in soil productivity.

Soil Porosity (Compaction)

Most of the proposed activity areas (91%) do not have a recent (<20 years) disturbance history. There is some recent disturbance in the areas proposed for underburning. Field observations of detrimental compaction on soils similar to the ones found in the proposed activity areas found less

than 5 percent compaction in areas with a previous management history. Observations made by the district hydrologist during review of the Plum Project's activity areas found that the majority proposed for treatment do not have readily apparent detrimental compaction. In the general project area, the compaction that was observed was on landings and skid trails adjacent to the landings. All of the Plum Project activity areas currently meet the Tahoe LRMP soil porosity standard.

Soil Organic Matter

As described below, organic matter currently exists in kinds and amounts sufficient to prevent significant nutrient cycle deficits, and to avoid detrimental physical and biological soil conditions.

Fine Organic Matter (Nutrient Cycling)
Fine organic matter, including litter, duff, and woody material < 3 inches diameter, currently occurs on >90% of the activity areas, and is on average 2-3 inches deep. This level is well within the Forest Plan Standard for fine organic matter.

Large Woody Material
The current downed woody material ranges from 0.5 to 28.1 tons per acre in the aerial thin treatment areas, to 1.5 to 63.5 tons per acre in the tractor treatment areas. Large woody material (logs >12 inches diameter and 10 feet long) currently exist in excess of 5 logs per acre, which is consistent with the Forest Plan standard guideline for maintaining large woody material.

Each of the action alternatives proposes varying types and levels of treatments. As these treatment prescriptions have differing effects on the soil resource, they are discussed individually below.

Alternative A

Mechanical Thinning - Ground-based

Soil cover: The direct effect of ground-based mechanical thinning would be a temporary reduction of total soil cover on skid trails and landings. The project hydrologist has prescribed 50 percent effective soil cover in all activity areas. Forest monitoring has shown treated units typically meet effective soil cover requirement of 40 to 50 percent immediately after treatment. This is acceptable to meet the Forest Plan standard for soil cover.

Porosity: Mechanical treatments can have the potential to cause detrimental levels of compaction. On the Foresthill Divide on the Tahoe NF, Helms and Hipkin (1986) reported a 59 percent reduction in timber volume on soils with the highest amount of compaction. This study found that the volume of an average tree was 21 percent less on the most compacted soils when compared to the least compacted, in the same general area.

Soil compaction is of greatest concern in areas proposed for ground-based (tractor) logging. However, detrimental levels of compaction are only anticipated where machine traffic is highly concentrated, such as landings and heavily used skid trails. The tractor ground can be further divided into volcanic soils (40 percent of the area proposed for ground-based harvest) and metasedimentary soils (48 percent of the area proposed for ground-based harvest). Research on

McCarthy soil series (a volcanic soil) and related volcanic soils demonstrated that these soils were clearly less susceptible to compaction when compared to 12 other California forest and rangeland soils (Howard et al. 1981). Volcanic soils in the project area have low susceptibility to compaction, due to the nature of volcanic soils and the rock fragment content of the soils. The metasedimentary soils in the proposed activity areas have moderately low susceptibility to compaction due to the loam to sandy loam textures and high rock fragment content. The risk of compaction is slightly higher on the metasedimentary soils in the activity areas, but the effects on soil productivity would be minimal. Because of the sandy loam and loam textures of the majority of soils in the proposed activity areas, the compaction caused by the project would have minimal effects on long-term soil productivity.

Based on past Forest-wide monitoring observations of ground-based mechanized equipment, landings are expected to be ¼ to 1 acre in size and may be severely compacted. Main skid trails used during the ground-based skidding would cover between 5 and 10 percent of the activity area and would be compacted to varying degrees. The skid trails would be more compacted and disturbed near the landing and less compacted and disturbed the further from the landing the skidding occurs. The main skid trails are most highly compacted. The density of skid trails would be higher near the landing where they converge. The secondary skid trails (trails that usually only receive 1 or 2 passes with skidding equipment) would cover an additional 10 to 15 percent of the area. Soil compaction and disturbance is usually slight to moderate on these trails.

Management requirements, including designating skid trails and skid trail spacing of 75 feet apart; lopping and scattering slash; limiting secondary skidding; limiting operations to when the soil is dry; subsoiling of temporary roads, landings and all skid trails within 100 feet of the landing; and re-using existing skid trails and landings (where possible) would limit reductions in soil porosity and potential impacts to long-term soil productivity.

Even with the above management requirements, some new detrimental compaction would occur within the proposed activity areas. Monitoring on the Plumas National Forest has shown that an average of 8-10 percent new compaction is added with each reentry with ground based equipment into an activity area. However, given that existing detrimental compaction in the activity areas with a previous management history is generally less than 5 percent, overall direct effects should be within the Forest Plan standards for porosity. There would be a small net benefit where old skid trails and landings are reused and then subsoiled. Monitoring on the Tahoe NF and other national forests in California shows that these management requirements have been demonstrated to limit the adverse effects of the proposed project activities on soil porosity.

Organic Matter: As with soil cover, litter and duff would be removed from a small portion of the area, primarily on skid trails and landings. In areas that are thinned, quantities of large woody material would not be reduced. Forest monitoring has shown that these areas meet Forest Plan standards for organic matter retention.

Mechanical Thinning - Aerial-based

Soil cover: The direct effect of aerial-based thinning (cable or helicopter) would be a temporary reduction of total soil cover on landings and, in the case of skyline yarding, in cable corridors. The project hydrologist has prescribed 60 percent effective soil cover in all aerial thinning activity areas.

Forest monitoring has shown treated units typically meet effective soil cover requirement of 60 percent. This is acceptable to meet the Forest Plan standard for soil cover.

Porosity: Skyline logging would affect soil porosity primarily in the skyline corridors, temporary road alignments, and landings. The loss in porosity found in skyline corridors is usually more of a surface sealing due to the dragging of the logs, not compaction due to loss of porosity deeper in the soil profile. Klock (1975) reported 25 percent disturbance caused by skyline logging, 22 percent slightly disturbed and 3 percent highly disturbed.

Under the proposed action, landings and temporary roads compacted by harvest traffic would be subsoiled to restore soil porosity and further limit effects to long-term soil productivity. Since landings and temporary roads would be subsoiled and aerial logging does not cause compaction, the activity areas proposed for aerial yarding are expected to meet the Forest Plan standard for porosity.

Organic Matter: Treatments would remove organic matter in kinds and amounts to achieve treatment objectives. As with soil cover, litter and duff would be removed from a small portion of the area, primarily in cable corridors and landings. However, nutrient loss from mechanical aerial-based thinning operations would be minimal within the treated areas as some limbs and treetops would remain on site. Thinning would promote vegetation growth, needle cast, and could create small openings for grass and nitrogen-fixing shrubs that could enrich the soil. Regrowth of biomass would bring the overall nutrient pool back to current levels in 10 to 20 years. In thinned areas, quantities of large woody material could be somewhat reduced; however, Forest monitoring of previous projects has shown that these areas meet LRMP standards for large woody material retention. Nutrient losses from the proposed mechanical aerial-based thinning treatments would not adversely affect long-term soil productivity.

Plantation Mastication

Soil cover: The mastication treatments would chip or shred standing vegetation. Therefore, the direct effect of plantation mastication would be an increase of total soil cover. Treated areas would meet the LRMP standard for soil cover.

Porosity: Mechanical mastication is proposed on 37 acres of plantations under Alternative A. Mastication would involve the use of low-ground-pressure (<8 psi) equipment. Direct and indirect effects to soil porosity would be less than that of the mechanical thinning operation since no skidding of material would be involved. Temporary roads and landings would not be needed in this operation. Ground-based mastication equipment operates primarily on a self-generated bed of slash.

Because mastication equipment travels on chipped or masticated material, mastication treatments have a low potential to cause detrimental levels of compaction. The compaction hazard rating of these soils is generally moderately low (63 percent of the acreage proposed for mastication) to moderate (22 percent of the acreage proposed for mastication), so detrimental levels of compaction are only anticipated where machine traffic is highly concentrated, such as landings and heavily used skid trails. Mastication treatments would meet the LRMP standard for porosity.

Organic Matter: As with soil cover, organic matter would be added to the soil surface. The LRMP standards for organic matter would be met in these activity areas.

Underburning

Soil cover: The direct effect of underburning would be a temporary reduction of total soil cover in the burned area. Cover would be eliminated in portions of activity areas where concentrations of fuels were burned. Based on previous projects on the Tahoe National Forest, adequate cover for erosion protection would exist in >60% of the area. This would be consistent with the Forest Plan standard for soil cover.

Forest Service Handbook 2509.18 – Soil Management Handbook provides threshold values for soil properties and conditions to use as indicators of significant change to soil productivity. In the discussion of Soil Quality Standards (FSH2509.18,2.2.1), the handbook states: "Prescribe the kind and amounts of soil cover that would not elevate wildfire risk or severity to the point that fuel management and soil quality objectives cannot be met. If there is no viable alternative for providing soil cover without elevating the risk of adverse wildfire effects, prescribe minimum soil cover needed to avoid detrimental soil loss." The project hydrologist has prescribed the minimum post-treatment effective soil cover at 50 percent.

Porosity: Underburning would not cause detrimental soil compaction.

Organic Matter: As with soil cover, underburning would remove litter and duff from a portion of the activity areas. Management requirements (detailed in Chapter II of this EA) are expected to protect large woody material; however, prescribed burning would likely remove some of the material in older decay classes. Given fuels reduction objectives for the area, this is considered acceptable for soil resource concerns. Management requirements to retain some of the fine surface fuels in 60 percent of the area would concurrently lead to burn prescriptions that avoid excessive soil heating and adverse effects upon soil organic matter. The Forest Plan Standard for large woody material would be met in all activity areas.

Hand Pile and Burn

Soil cover: The direct effect of hand piling and pile burning would be a temporary reduction of total soil cover in proposed activity areas. Soil cover would be eliminated in portions of activity areas where concentrations of fuels were burned. Monitoring of tractor piling on the Eldorado National Forest has shown that adequate effective soil cover for erosion protection would exist in the activity areas after hand piling and pile burning treatments. The results would be consistent with the Forest Plan standard for soil cover.

Porosity: Hand piling and pile burning would not cause detrimental levels of compaction.

Organic Matter: As with soil cover, hand piling and pile burning would remove litter and duff from a portion of the activity areas. Management requirements (detailed in Chapter II of this EA) would be expected to protect large woody material; however, prescribed burning would likely remove some of the material in higher decay classes. Given fuels reduction objectives for the area,

this is considered acceptable for soil resource concerns. Management requirements would concurrently lead to burn prescriptions that avoid excessive soil heating and adverse effects upon soil organic matter. Monitoring of similar work on the Eldorado National Forest has shown that these types of treatments would be consistent with the Forest Plan standards. Large woody material standards would be met in all activity areas following hand piling and pile burning treatments.

Specified Road Reconstruction

Most transportation activities take place within a corridor dedicated to roads and trails, therefore the soil quality standards to not apply to these areas.

Temporary roads could disturb soil. All temporary roads would be decommissioned at the end of the project which would decrease the potential road related impacts to soil productivity.

Alternative A: Summary of Direct and Indirect Effects

Soil Cover: There would be a short-term reduction of soil cover on skid trails and landings. Prescribed burning would also decrease soil cover. Soil cover is expected to meet Forest Plan standards and guidelines for soil cover under all management activities proposed in Alternative A.

Soil Porosity: Detrimental compaction under Alternative A would be limited in degree and extent as approximately 1,188 acres are proposed for ground-based logging, and 40 percent of that is on volcanic soils that have low susceptibility to compaction. Other factors which limit the risk and effect of compaction include the sandy loam textures, rock fragment content, and rapid drainage for metasedimentary soils in the other proposed activity areas (48 percent), and management requirements (detailed in Chapter II of this EA) that protect soils during logging. Since the soils in the proposed activity areas have relatively low susceptibility to compaction, compaction caused by the proposed action would be limited to landings and highly compacted skid trails adjacent to the landings.

Soil Organic Matter: In areas that are thinned, quantities of large woody material would be somewhat reduced, but Forest Plan soil quality standards organic matter would be met.

Alternative B: Summary of Direct and Indirect Effects

There are no direct effects of the No Action alternative on the soils, as soil disturbing project activities would not take place. Present compaction levels would remain the same in the short-term, with very slow long-term natural recovery; organic matter would continue to accumulate.

Indirect effects of the No Action alternative would be the increased accumulation of organic matter in terms of surface and ladder fuels, with a corresponding continual increase in fire hazard. Fire hazard is not the probability of a fire ignition, but that a fire ignition (human or lightning caused) would result in a successful fire start, and the resulting fire behavior would be expected to have adverse effects on soil productivity.

Alternative C: Summary of Direct and Indirect Effects

Soil Cover: There would be a short-term reduction of soil cover in areas that are piled, chipped, or burned. Soil cover is expected to meet Forest Plan standards and guidelines for soil cover under all management activities in Alternative C.

Soil Porosity: Detrimental compaction under Alternative C would be limited in degree and extent as approximately 859 acres are proposed for ground-based operations, and 40 percent of that is on volcanic soils that have low susceptibility to compaction. Other factors which limit the risk and effect of compaction include the sandy loam textures, rock fragment content, and rapid drainage for metasedimentary soils in the other proposed activity areas (48 percent), and management requirements that protect soils. Since the soils in the proposed activity areas have relatively low susceptibility to compaction, compaction resulting from implementation of Alternative C would be limited.

Soil Organic Matter: In areas that are treated, existing quantities of large woody material would be retained as treatments would focus on removing small trees. Forest Plan standards and guidelines for organic matter retention would be met under Alternative C.

Wildlife:

Information used in assessing effects includes: computer Geographical Information System layers (e.g. Digital Orthophoto Quads, Sierra Nevada Forest Plan Amendment Land Allocations, Forest Vegetation and Disturbance layers for public and private land, streams, roads, California spotted owl and northern goshawk Protected Activity Centers and Home Range Core Areas), aerial photos, survey records and species sighting data. Fish and wildlife species-specific surveys conducted in all or portions of the project area include: California red-legged frog, California spotted owl, northern goshawk, northwestern pond turtle, foothill yellow-legged frog, and mountain yellow-legged frog. Site-specific stand data includes field review by biologists, the District Silviculturist, and existing stand condition data on: ground fuels, canopy cover, snags, downed logs, and trees per acre broken down by diameter class and species. Aquatic assessments include information gained through stream surveys, amphibian habitat assessments, evaluation of the potential effects of proposed treatments in riparian conservation areas (RCAs), and the results of the cumulative watershed effects analysis.

The following reports address the direct, indirect, and cumulative effects from the alternatives to wildlife species in detail, and they are incorporated into this EA by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates dated November 18, 2010 and (2) Management Indicator Species Report dated November 29, 2010.

There are no federally endangered, threatened, or proposed species or their designated critical habitat within the project area that may be affected by the proposed actions. No California red-legged frog populations have been found that occur in the Tahoe National Forest, and no Critical Habitat is present in the project area. This project is not within the range of the Elderberry longhorn beetle or

the Lahontan cutthroat trout. The Biological Evaluation has determined that there is no effect from any of the alternatives to any federally protected species.

The following Region 5 Forest Service Sensitive Species, or their habitat, are present within or near the project area: California spotted owl, northern goshawk, Pacific fisher, American marten, California wolverine, pallid bat, Townsend's big-eared bat, and the foothill yellow-legged frog.

A Biological Evaluation has determined that the action alternatives: 1) will not affect the greater sandhill crane, great gray owl, willow flycatcher, Sierra Nevada red fox, western red bat, northwestern pond turtle, mountain yellow-legged frog, northern leopard frog, Great Basin ramshorn snail, Lahontan Lake tui chub, and hardhead; and 2) may affect, but will not lead to a trend toward listing of, the California spotted owl, northern goshawk, American marten, Pacific fisher, California wolverine, pallid bat, Townsend's big-eared bat, and foothill yellow-legged frog.

Effects Common to each of the action alternatives (Alternatives A and C)

Direct Effects: Direct effects to wildlife may occur from killing, injuring, or displacing individuals or interfering with feeding, movement, and migration. Noise from operating motorized equipment during project implementation, or smoke from prescribed burning, could displace individual animals from the vicinity of units. The proposed activities cover approximately 3,050 acres (18%) out of 18,903 acres of National Forest System land within the Plum Project area. Individual activities are typically implemented over a five to ten-year period, which spreads out disturbances both spatially and temporally within any one location. This further limits the area affected by disturbances to an estimated area of 2 to 8% of the project area in any individual year. This effect is temporary, lasting only several months during the year when they are implemented. Surveys have been conducted following standard protocols for the following species within all or parts of the analysis area: California spotted owl, northern goshawk, California red-legged frog, foothill yellow-legged frog, northwestern pond turtle, and bats. Conducting surveys to protocol insures for consistency in searching for breeding territories, and limited operating periods are included in the management requirements (see Chapter II) where territories have been located, to reduce the potential for projects to either directly impact individuals or disrupt breeding. The project Biological Evaluation and Management Indicator Species reports detail the specific effects by species, and numbers of spotted owl and goshawk territories with the effects of each of the treatment prescriptions in detail.

Indirect Effects: Indirect effects to wildlife may occur from altering the quantity or quality of habitat. In both action alternatives (A, and C), fuels treatment would occur in a total of 1,645 acres as follows: hand cut, tractor pile and burn 18 acres of shrubs and 162 acres of mid-seral forests; mechanically thin 419 acres of plantations, prescribe burn 133 acres of plantations, 137 acres of hardwood and hardwood-conifer forests, and underburn 972 acres of mid-seral forests. These treatments would reduce dense shrub cover to sparse on 18 acres of shrubs, and within approximately 761 acres of early-seral and open canopy mid-seral forests that have a component of shrubs.

Prescribed burning would initially reduce shrubs within approximately 779 acres. This may reduce hiding and thermal cover for small mammals. Within one year, herbaceous plants are likely to return, providing both food and some cover for small mammals that serve as prey to numerous

Forest Service Sensitive species (spotted owls, goshawks, marten). Shrubs in the genus *Ceanothus* contain more balanced nutrients for deer than do manzanita, and they are preferred as browse. Prescribed burning shrubs would promote the presence of deerbrush (*Ceanothus integerrimus*) and whitethorn (*Ceanothus cordulatus*) because they grow more quickly, and are generally considered to be early- successional shrubs compared to manzanita (*Arctostaphylos viscid* and *Arctostaphylos patula*). Several years following burning, newly germinated and re-sprouted shrubs will provide more nutritious forage for deer.

In contrast, cutting, piling, and burning brush, either by hand or mastication in approximately 342 total acres would not favor *Ceanothus* in the same way, because it would not stimulate the germination of new seedlings from the seedbank in the soil.

Using a variety of techniques to reduce fuels in the watershed (masticating, prescribed fire, hand cutting, thinning) varies their effects spatially throughout the watershed. Activities that require appropriated funding to implement (mastication, hand-thinning, prescribed fire) would be implemented over a period of time, which would distribute their effects temporally over several years. Studies have shown that small mammals (woodrats, deer mice) quickly repopulate burned areas, provided there are nearby unburned refugia to provide source populations. Masticating and burning may reduce small mammal populations in the first year or two following implementation, but populations are expected to readily recover thereafter.

Alternatives A and C propose underburning within 643 acres (15%) of mid-seral closed-canopy forests. These forests provide habitat for Forest Service Sensitive Species such as the California spotted owl, northern goshawk, American marten, and Pacific fisher, where important habitat components include closed canopy cover (greater than 50%), large trees, large downed logs, and large snags. Prescribed burning is only proposed where existing conditions indicate a high probability of successfully retaining post-treatment stand conditions that are desirable for older forests. Burning prescriptions are developed to minimize the loss of large trees, large downed logs, and large standing snags where practical and where firefighter safety is not compromised. Some existing snags and down logs would be consumed by the fire, and some trees would likely die from the additional stresses from burning. Dead trees would be recruited as snags, and subsequently, down logs. Large snags provide nesting, resting, and sheltering structures for spotted owls, forest carnivores, and their prey. Stephens and Moghaddas (2005) found that use of prescribed fire increased the density of snags greater than 15 cm DBH, and did not significantly alter coarse woody debris in decay classes 1 and 2. Downed logs provide nutrient cycling, maintain soil moisture and provide microclimates for fungi. In the same study by Stephens and Moghaddas (2005), fire reduced coarse woody debris in decay classes 3 and 4. The use of prescribed fire would increase the resilience of these stands to catastrophic loss in a wild fire, and it re-introduces fire back into the system as a dynamic process.

Containing and controlling non-native, invasive species would reduce the degree to which these plants would displace native vegetation, and help to maintain the integrity and function of these ecosystems and their ability to provide food and shelter for wildlife. Mitigations are included to prevent the spread of noxious weeds into the project area from the proposed actions. This would help to sustain native vegetation and the quality of wildlife habitat.

Effects that Vary by Alternative

Alternative A includes proposals to thin 1,319 acres of closed-canopy conifer stands, implement oak enhancement, create wildlife cover piles, and decommission approximately 7.23 miles of roads. Alternative C does not implement any of these actions. Alternative C only implements fuels reduction proposals (hand cut and tractor pile and burn; prescribed burn, and masticate), which are also included in A. Under Alternative C, no thinning would occur within 1,319 acres, 44 fewer acres of plantations would be managed, and no roads would be decommissioned.

Acorns from oaks provide an important food source for wildlife, including mountain quail, gray squirrels, dear and bear; and acorns are especially important to animals during the fall, as they prepare to enter winter. Elevations within the project area are within deer fall and summer holding habitat, where maintaining sufficient acorn-producing oaks can be especially valuable. The units proposed for thinning under Alternative A presently have either suppressed oaks and/or small conifers dominating their under-story, and few palatable, nutritious shrubs and herbaceous vegetation.

Because not all species of oaks or conifers produce a high seed crop every year, managing stands so that they have a mix of conifer species, better insures that some of the species are producing seeds within any given year. This subsequently provides a more reliable food source for wildlife. Overly dense stands within the project that lack small openings do not allow for the maintenance of shade-intolerant species such as pine and oaks to regenerate and thrive, as they are becoming replaced by shade-tolerant species such as white fir.

Thinning would not reduce the dominant over-story tree canopy cover, and the proposals in Alternatives A and C retain all post-treatment canopy covers above 40 percent, which would not effectively rejuvenate existing shrubs or stimulate seedling establishment for shade intolerant species.

Silvicultural prescriptions for thinning in Alternatives A within existing closed-canopy stands are designed to meet several objectives: (1) promote black oak by removing competing conifers, (2) improve conifer species diversity, by selecting against white fir and favoring pine, (3) reduce conifer density by thinning out understory and some co-dominant trees, (4) retain all trees greater than 30 inches diameter, (5) retain trees with good characteristics for supporting wildlife, such as trees with multiple tops and cavities, and (6) thin irregularly to meet the previous objectives and to increase within-stand heterogeneity in structure and species composition. Thinning crowded trees reduces their susceptibility to dying from insect attack, and it promotes the development of larger crowns and branches, which provide good perching and resting structures for wildlife. Oaks that have larger crowns produce more acorns. Thinning around oaks and existing large trees will help retain their presence in stands, and improve their ability to provide abundant seed crops.

Because different tree species produce abundant seed crops in different years, promoting hardwoods and increasing overall tree species diversity within stands provides a more reliable seed source that serves as food for wildlife. This maintains prey populations for many predatory birds and mammals,

including the following sensitive species: California spotted owl, northern goshawk, American marten, Pacific fisher, Sierra Nevada red fox and wolverine.

No thinning would space trees so far apart so that arboreal (tree-dwelling) mammals would no longer use them. In a study in the Tahoe National Forest, Garrison et al. (2005) conclude that group select harvests where trees are harvested from small areas (less than 1 ha) should maintain populations of gray and Douglas squirrels. Snags and downed logs are important components of wildlife habitat by providing nesting habitat for spotted owls, resting and denning habitat for forest carnivores, shelter for prey species, and subnivean access points used by marten for foraging. Timber harvest would retain all existing logs, and any non-merchantable cull would be left for wildlife, which would result in a small increase in downed logs.

Small mammals use downed wood as travel corridors, cover, and as foraging places for arthropods and fungi. They also use herbs and shrubs for hiding cover and food. These structural components of forests may also be important for moderating microclimate, especially at the forest floor. Thinning and underburning alter the quantity and spatial distribution of down wood and ground vegetation, which may change small mammal populations. Fire and thinning can decrease the abundance of forest truffles, thereby reducing a major food source for many small mammals (Meyet et al. 2005).

Within similar vegetation types as this project (ponderosa pine and white fir forests), Maguire et al. (2008) studied small mammal responses to silvicultural manipulation of forest structural diversity and subsequent underburning. Treatments differed from high structural diversity (many large old trees, abundant snags, multiple canopy layers with dense clumps of smaller trees and many canopy gaps) to low structural diversity (single canopy layer of well-spaced overstory trees ranging in dbh from 30 to 50 cm with very few canopy gaps). They found that: (1) The most important habitat descriptors for determining small mammal presence included shrub cover, down wood cover, and overstory basal area, (2) No treatment effects were detected when all species were lumped together or for the three most frequent species analyzed separately (*Tamias amoenus, Peromyscus maniculatus*, and *Spermophilus lateralis*), (3) *T. amoenus* was captured more often in burned units, and (4) *T. amoenus* was captured more frequently in units of low structural diversity and *S. lateralis* in units of high structural diversity.

Proposals to construct wildlife cover piles helps to mitigate reduced cover (hiding and thermal) for small mammals following thinning, masticating, and burning within units. Proposals to remove small diameter conifers (less than 10" dbh) from beneath and around oaks would remove non-commercial conifers that would otherwise compete with the oaks for sunlight and nutrients, and eventually grow to overtop them and shade them out. Therefore, thinning, mastication, and underburning may change the species composition of small mammal prey.

Applying a registered borate compound to cut conifer stumps > 14 inches dbh in order to reduce the chance of new infection centers of *Annosus* fungi being stimulated through harvest activity would not occur within any units have any riparian areas within them, and this action would not negatively affect any Forest Service Sensitive amphibian species.

Existing road densities range from approximately three to six miles of road per square mile.

Alternative A includes proposals to decommission approximately 7.23 miles (7 acres) of road that are spread out across the analysis area, which would not reduce overall road densities within the watershed, but it would reduce road densities within the immediate area of where they occur. Approximately 0.5 miles of road proposed for decommissioning presently accesses a sensitive spotted owl area, which would reduce human disturbances to this sensitive species.

Thinning under Alternative A would reduce canopy cover within 1,319 acres of closed-canopy stands. Canopy cover for each unit proposed for thinning was calculated using stand exam data collected in the field. Table 3-1 shows the existing canopy cover (Alternative B, the No Action Alternative) for each of the proposed units and the estimated canopy cover following thinning in Alternative A. This Table (3-1) also shows the maximum diameter of tree that would be removed under the silvicultural prescription that was developed using the individual stand characteristics to move stands towards the desired condition to increase structural diversity and late-successional structural characteristics. Tables showing individual stand characteristics, including Stand Density Indices (SDI) and Trees Per Acre (TPA) by unit are shown in Appendix D, Vegetation Data in the Plum Environmental Assessment.

Table 3-1. Mechanical thinning units in the Plum Project showing the pre- and post-treatment canopy cover and the maximum tree diameter breast height (dbh) that may be removed for each of the action alternatives.

Unit No.	Acres	Alt. B (No Action) Existing Canopy Cover (%)	Alt. A Post-treatment Canopy Cover (%)	Alt. C Post-treatment Canopy Cover (%)	Alt. A Maximum tree dbh removed (inches)	Alt. C Maximum tree dbh removed (inches)
2	22	65	56	dropped	26	dropped
4	105	60	53	dropped	26	dropped
5	31	68	58	dropped	26	dropped
6	13	68	58	dropped	26	dropped
7	108	88	79	dropped	18	dropped
9	29	76	61	dropped	29	dropped
10	76	62	54	dropped	26	dropped
11	46	80	62	dropped	29	dropped
14	32	71	64	dropped	26	dropped
15	53	75	58	dropped	28	dropped
16	23	81	78	dropped	29	dropped
17	128	73	61	dropped	24	dropped
17s		73	60	dropped	27	dropped
18	43	81	77	dropped	29	dropped
19	25	87	85	dropped	29	dropped
20	65	87	79	dropped	29	dropped
21	33	76	70	dropped	28	dropped
22	40	78	63	dropped	29	dropped
23	42	82	77	dropped	20	dropped
24	18	82	77	dropped	20	dropped
25	18	87	85	dropped	28	dropped
26	50	69	50	dropped	16	dropped
29	42	85	64	dropped	26	dropped
30	70	73	57	dropped	26	dropped
30 (defense)		73	54		29	

31 (defense)	34	66	40	dropped	29	dropped
32	61	66	60	dropped	24	dropped
33	29	67	60	dropped	28	dropped
34	10	92	92	dropped	14	dropped
35	17	86	83	dropped	12	dropped
37	20	58	50	dropped	22	dropped
38	36	68	55	dropped	24	dropped
Totals	**1,319**	**Range = 58-92**	**Range = 40-92**		**Range = 12-29**	

Under Alternative A, canopy cover would be reduced within 1,319 acres (24%) of mid- to late-successional, closed-canopy (>40%) stands out of the 5,450 that are present in the analysis area. Post-treatment canopy closures in Alternative A remain above 50% in all units except for one—Unit 31, which is 34 acres (3%) of the 1, 319 acres proposed for thinning. This unit comprises less than 1% of mid- to late-successional closed-canopy forests (California Wildlife Habitat Relationship types $\geq$ 4M) that are present within the project area.

Retaining canopy cover above 50% in all of the remaining units would keep these habitats suitable for continued use by many sensitive species which prefer closed canopy stands (California spotted owl, northern goshawk, American marten, Pacific fisher). Specific effects by habitat type follows in the individual species effects section of this Biological Evaluation.

The existing CWHR type (Alternative B, No Action) for each thinning unit proposed, and the changes that would occur under Alternative A are listed for each of the units in Table 3-2. Alternative A would change CWHR types from 4D (dense canopy cover) to 4M (moderate canopy cover) on 440 (33%) out of the 1,319 acres that are thinned, which represents 7% of the existing closed-canopy stands present within the analysis area. Under Alternative C, none of the thinning in mid- to late- successional stands would occur, and 45 fewer acres of plantations would be thinned. Within these untreated acres the existing trees would continue to compete for resources, slowing their growth, and unnaturally dense stands with ladder fuels will be subjected to greater risk of burning intensely under a wild fire.

Table 3-2. Mechanical thinning units in the Plum Project showing the pre- and post-treatment vegetation by California Wildlife Habitat Relationship type (CWHR).

Unit No.	Estimated Acres	Existing CWHR type* (Alt. B)		Alt. A		Alt. C (Stands not thinned)
		canopy	CWHR	canopy	CWHR	
2	22	65	4D	56	4M	dropped
4	105	60	4D	53	4M	dropped
5	31	68	4D	58	4M	dropped
6	13	68	4D	58	4M	dropped
7	108	88	4D	79	4D	dropped
9	29	76	4D	61	4D	dropped
10	76	62	4D	54	4M	dropped
11	46	80	4D	62	4D	dropped
14	32	71	4D	64	4D	dropped
15	53	75	4D	58	4M	dropped
16	23	81	4D	78	4D	dropped
17	128	73	4D	60	4D	dropped
18	43	81	5D	77	5D	dropped
19	25	87	4D	85	4D	dropped
20	65	87	4D	79	4D	dropped
21	33	76	4D	70	4D	dropped
22	40	78	4D	63	4D	dropped
23	42	82	4D	77	4D	dropped
24	18	82	4D	77	4D	dropped
25	18	87	4D	85	4D	dropped
26	50	69	4D	50	4M	dropped
29	42	85	4D	64	4D	dropped
30	35	73	4D	57	4M	dropped
30 (defense)	35	73	4D	54	4M	dropped
31 (defense)	34	66	4D	40	4M	dropped
32	61	66	4D	60	4D	dropped
33	29	67	4D	60	4D	dropped
34	10	92	4D	92	4D	dropped
35	17	86	4D	83	4D	dropped
37	20	58	4M	50	4M	dropped
38	36	68	4D	55	4M	dropped
TOTAL	**1,319**	**Range = 58-92**		**Range = 40-92**	490 acres change from D to M	

*Note: Existing CWHR type is identified using stand exam data, rather than mapped strata.

Projections for the amount of canopy that is estimated to return after 10, 20, and 30 years were calculated using the Forest Vegetation Simulator (FVS), and they are displayed in Table 3-3 for each unit that would be thinned under Alternative A. Under Alternative C, the thinning would not occur. Within most all units, canopy cover recovers within 10 years post treatment, and changes little over the next 20 years. Therefore, any reduction in the quality of late-successional habitat that may occur from reducing canopy cover through thinning is a short-term effect, lasting 10 to 15 years or less.

Table 3-3. Mechanical thinning units in the Plum Project showing the pre- and post-treatment canopy cover and the estimated canopy cover in 10, 20, and 30 years following thinning under Alternative A.

Unit No.	Unit (Ac.)	Alt B (existing canopy)	Alt A post treatment	10 years post treatment	20 years post treatment	30 years post treatment
2	22	65	56	65	71	70
4	105	60	53	60	66	65
5	31	68	58	69	73	70
6	13	68	58	69	73	70
7	108	88	79	88	84	80
9	29	76	61	65	64	62
10	76	62	54	62	66	65
11	46	80	62	82	82	80
14	32	71	64	54	53	52
15	53	75	58	73	71	68
16	23	81	78	82	87	88
17	128	73	60	73	74	75
18	43	81	77	63	63	62
19	25	87	85	97	88	87
20	65	87	79	85	84	83
21	33	76	70	77	81	81
22	40	78	63	78	78	83
23	42	82	77	82	81	77
24	18	82	77	82	81	77
25	18	87	85	87	88	87
26	50	69	50	69	75	71
29	42	85	64	85	83	81
30	35	73	57	74	78	77
30 (defense)	35	73	54	74	78	77
31 (defense)	34	66	40	67	67	65
32	61	66	60	62	62	60
33	29	67	60	67	71	75
34	10	92	92	92	91	89
35	17	86	83	89	86	84
37	20	58	50	64	68	70
38	36	68	55	70	74	75
Totals	**1,319**					
		Range = 60-92	**Range = 40-92**	**Range = 54-92**	**Range = 53-91**	**Range = 52-89**

Late-successional forests are characterized by a complex forest structure. The proposed actions would occur within forest stands that generally lack a complex forest structure. Increasing tree species diversity, promoting understory vegetation, creating small openings, and maintaining and promoting a range of size and age classes would move these stands towards improving late-successional forest structure, with a short term in reduction in canopy cover that would typically return to, or exceed, pre-treatment levels as shown in Table 3-3 above.

Both Alternatives A and C implement fuels reduction treatments equally. Alternative A better moves mature stands towards their desired condition of an old-forest structure by thinning 1,319

acres that would not be thinned under Alternative C. Alternative A actively manages these stands through silvicultural prescriptions that develop late-successional forest structure. Diversity within stands would be encouraged by retaining all trees greater than 30" dbh, retaining sufficient numbers of larger trees in the 20-30" dbh sizes for large tree recruitment in the future, thinning to create small openings in forest stands for shade intolerant species such as hardwoods and pine to regenerate and persist, and reduce tree competition around very large trees.

Fire and Fuels:

Fire Behavior

The predicted fire behavior within the units under consideration for treatment can be described by modeling both the current conditions within each of the units and the condition that would result with implementation of the action alternatives. The fire behavior predictions described below were based on the FMA+ Program, a fire behavior analysis program that computes potential fire behavior characteristics (rate of spread, flame lengths, etc.) based on stand exam and Brown's planar transect data. Site specific data used in the program include the topographical data (slope, elevation, and aspect), fuel models and tree condition (canopy cover, height to live crown, total height, and crown bulk density) derived from both satellite data and on the ground evaluation, predicted fuel models for post treatment analysis, and the 90th percentile weather for the area. The 90th percentile weather conditions are standard weather parameters used for fire behavior prediction modeling on the Tahoe National Forest. The data used in calculating the 90th percentile conditions was derived from the Saddleback National Fire Danger Rating System weather station located on the Yuba River Ranger District and are as follows:

Table 3-4. 97th Percentile Weather

Dispatch Level	Moderate
1 Hour Fuel Moisture	5 percent
10 Hour Fuel Moisture	6 percent
100 Hour Fuel Moisture	7 percent
1000 Hour Fuel Moisture	10 percent
20 Foot Wind Speed	20 mile per hour
Live Herbaceous Fuel Moisture	75 percent
Live Woody Fuel Moisture	90 percent

Table 4, *97th Percentile Weather*

The surface fuels in the units to be treated can be described by numerous different fuel model types, including FBPS fuel models 11, 10, and 8. The aerial fuels (attached dead tree branches, live crown, and resulting crown bulk density) cover the entire range from heavy to light.

The fire behavior descriptors used in evaluating the pre and post proposed treatments are flame length, rate of spread, fireline intensity and crown fire behavior.

1) Flame Length: 4' is generally considered the upper limit for direct action taken by hand crews and 6' is considered the upper limit for direct action taken by mechanized equipment (dozers). Flame lengths in excess of these limits usually results in indirect action taken to contain the fire.
2) Rate of Spread: For initial action productivity, which includes only scratch line construction and hot spotting, a hand crew can generally produce 0.7 chains per hour per person in both fuel models 4 and 5. For sustained line production, including burnout and holding activities, a 20-person type 2 crew would produce approximately 3 chains per hour in a fuel model 4 and 4 chains per hour in a fuel model 5.
3) Fireline Intensity: Fireline intensity is the amount of heat released at the flaming front of a fire expressed in British thermal units per foot per second (btu/ft/sec). Intensities in excess of 100 btu/ft/sec are generally considered too hot for direct action by personnel. Fireline intensities greater than 500 btu/ft/sec are considered too hot for direct action by mechanized equipment.
4) Crown Fire Behavior: Fire behavior can be described in four ways; the first is a surface fire which burns only the fuels at or near the surface without torching the trees above. This is the desired condition. The second type is the passive crown fire which torches out individual trees as the surface fuels burning under them provide the convective heat to ignite the aerial fuels. The third is the active crown fire in which the fire is spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. The fourth is the running crown fire. This is a very rare occurrence in which the fire is spread from tree to tree independent of the burning surface fuels. This type of crown fire requires extreme weather conditions and contiguous heavy tree canopy and is not modeled for.

Mechanical Thinning of Natural Stands

It is important to note that mechanical thinning of natural stands is aimed at meeting forest health and wildlife objectives, as described in Chapter I for the proposed action and displayed in Table 1-6. Meeting these objectives through mechanical thinning of natural stands would have ancillary beneficial effects on moderating fire behavior as disclosed below.

Flame length predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-5. Flame Length - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
0 to 4 feet	954	1140	954	954
4 to 6 feet	383	229	383	383
> 6 feet	0	0	0	0

Table 5, *Flame Lengths*

Alternative A would decrease the number of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire by 40%. There would be no increase in acres potentially producing flame lengths greater than 6 feet. This result would indicate that 83% of the acres in the Alternative A

project units would produce flame lengths low enough to allow initial attack of a wildfire by hand crews and engine modules. On the Yuba River Ranger District, the initial attack forces are made up of these types of resources. The time saved in waiting for mechanized equipment (dozers) to arrive could potentially result in smaller fires.

Alternatives B and C would have no effect on the number of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire. There would be no increase in acres potentially producing flame lengths greater than 6 feet. This result would indicate that 30% of the acres in the Alternative B and C project units would produce flame lengths low enough to allow initial attack of a wildfire by hand crews and engine modules. One can see that this is consistent with the current condition.

Rate of spread predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-6. Rate of Spread - Acres

	Current Condition	Alternative A	Alternative B	Alternative C
0 to 20 ch/hr	1218	1369	1218	1218
20 to 40 ch/hr	119	0	119	119
> 40 ch/hr	0	0	0	0

Table 6, *Rates of Spread*

Alternative A shows an increase in Rates of Spread (ROS) of less than 40 ch/hr by 10%, and a decrease in ROS greater than 40 ch/hr by 30%. Alternatives B and C show no increase or decrease in Rates of Spread (ROS) of less than 40 ch/hr.

Fireline intensity predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-7. Fireline Intensity - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
0 to 100 btu/ft/sec	954	1140	954	954
100 to 500 btu/ft/sec	383	229	383	383
> 500 btu/ft/sec	0	0	0	0

Table 7, *Fireline Intensity*

Alternative A would decrease the number of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec by approximately 40%. This result would indicate that 83% of the acres in the project units would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Alternatives B and C would have no effect on the number of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec by approximately. This result would indicate that 30% of the acres in the project units would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Crown fire activity predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-8. Crown Fire Potential - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
Surface	1198	1351	1198	1198
Passive Crown	116	18	116	116
Active Crown	23	0	23	23

Table 8, *Crown Fire Activity*

Alternative A would potentially result in all but 18 acres in the Plum treatment units producing surface fire conditions in the event of a wildfire. This translates into greatly reduced potential for both tree mortality from torching and spotting from blown firebrands.

Alternatives B and C would potentially result in all but 139 acres in the Plum treatment units producing surface fire conditions in the event of a wildfire. Alternatives B and C show no decrease in Crown Fire Potential after treatment.

The increase in Crown Base Height (CBH) in Alternative A is one of the main contributors to the change in the Crown Fire Potential. This increase in distance between the surface fuels and the tree crowns is critical in bringing potential fires to the surface where they can more easily be suppressed. Alternatives B and C show no increase in overall CBH. A possible explanation for this difference in change of Crown Fire Potential could have to do with the heavier thinning of larger trees in Alternative A, thus giving a greater increase in CBH than Alternatives B or C where no trees are being thinned.

Underburning in the natural units would be conducted as needed to meet fuels objectives after thinning operations. Underburning allows for surface fuels reduction without disturbance or rearrangement to surface fuels. This "treatment in place" would reduce surface fuels and thus reduce rate of spread, flame length and fireline intensities in case of wildfire. The act of burning has been used on this land historically.

When the above listed fire behavior descriptors are taken in combination, the resulting fire behavior in the area after treatment provides for safer and more effective firefighting. Additionally, the resource damage potential of a wildland fire in the treatment units is greatly reduced.

Fuels Treatment Units

Hand Thinning, Tractor Piling, and Pile Burning

The primary purpose of hand thinning, tractor piling, and pile burning is to reduce hazardous fuels, as described for Alternative A in Chapter I and Alternative C in Chapter II. The Plum Project would involve 403 acres of hand cut with follow up tractor piling in Alternatives A and C. The units involved in this activity are currently considered densely growing stands of fir and pine, with dog hair thickets of small regeneration that act as fuel ladders. By thinning the understory (hand cut) up to a 9 inch diameter, the Crown Base height would be raised. The cut trees would then be piled along with existing surface fuels. These two activities combined are very effective at reducing crown fire potential in densely populated stands. Along with reduction in crown fire potential, generally speaking the flame lengths would be shorter. With the removal of surface fuels, the overall fireline intensities of these stands would be reduced as well.

Flame length predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-9. Flame Length - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
0 to 4 feet	293	403	293	403
4 to 6 feet	110	0	110	0
> 6 feet	0	0	0	0

Table 5, *Flame Lengths*

Alternatives A and C would decrease the number of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire by approximately 38%. This result would indicate that 100% of the acres in the Alternative A and C fuels reduction units would produce flame lengths low enough to allow initial attack of a wildfire by hand crews and engine modules.

Alternative B would have no effect on flame lengths in the event of a wildfire. Fuel loadings would continue to build under Alternative B and these lengths may increase over time.

Rate of spread predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-10. Rate of Spread - Acres

	Current Condition	Alternative A	Alternative B	Alternative C
0 to 20 ch/hr	403	403	403	403
20 to 40 ch/hr	0	0	0	0
> 40 ch/hr	0	0	0	0

Table 6, *Rates of Spread*

Alternatives A and C show no increase or decrease in Rates of Spread (ROS) of any speed within the hand thinning, tractor piling, and pile burning treatment units. Alternative B also shows no increase or decrease in Rates of Spread (ROS) of any speed under stagnant conditions. Fuel loadings would continue to build under Alternative B and these rates may increase over time.

Fireline intensity predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-11. Fireline Intensity - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
0 to 100 btu/ft/sec	293	403	293	403
100 to 500 btu/ft/sec	110	0	110	0
> 500 btu/ft/sec	0	0	0	0

Table 7, *Fireline Intensity*

Alternatives A and C would decrease the number of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec by approximately 38%. This result would indicate that 100% of the acres in the project units would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Alternative B would have no effect on the producing fireline intensities within the Plum hand thinning and pile burning treatment units. This result would indicate that over 73% of the acres in the fuels treatment units would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Crown fire activity predictions for both the current condition and the post treatment condition are described in the following table:

Table 3-12. Crown Fire Potential - Acres

	Current Condition	Alternative A	Alternative B	Alternatives C
Surface	403	403	403	403
Passive Crown	0	0	0	0
Active Crown	0	0	0	0

Table 8, *Crown Fire Activity*

Alternatives A and C would potentially result in all acres in the Plum fuels treatment units producing surface fire conditions in the event of a wildfire. This translates into greatly reduced potential for both tree mortality from torching and spotting from blown firebrands. Alternative B would also result in all acres in the Plum fuels treatment units producing surface fire conditions in the event of a

wildfire, however, fuel loadings would continue to build under Alternative B and this potential may increase over time.

The increase in Crown Base Height (CBH) in Alternatives A and C is one of the main contributors to the change in the fire behavior. This increase in distance between the surface fuels and the tree crowns is critical in bringing potential fires to the surface where they can more easily be suppressed.

When the above listed fire behavior descriptors are taken in combination, the resulting fire behavior in the area after treatment provides for safer and more effective firefighting. Additionally, the resource damage potential of a wildland fire in the treatment units is greatly reduced.

Underburning

Both action alternatives (Alternatives A and C) propose underburning on 1,242 acres in fuels units I and J within the Plum Project area. Additional underburning in the remaining fuels units would be conducted as needed to meet fuels objectives. Underburning allows for surface fuels reduction without disturbance or rearrangement to surface fuels. This "treatment in place" would effectively reduce surface fuels under both Alternatives A and C, and thus reduce rate of spread, flame length and fireline intensities in case of wildfire. Alternative B does not propose underburning so potential fire behavior would remain at existing elevated levels on the 1,242 acres in Units I and J.

Plantation Treatments

Both Alternatives A and C propose hazardous fuels reduction treatments within plantations in the Plum Project area as follows: approximately 37 acres of mastication and 419 acres of mechanical ground-based thinning.

Air Quality:

Air Quality Effects of Alternatives A & C

Predicted emissions from prescribed burning in the Plum Project area have been estimated using emission factors from EPA Document 42 and are based on an estimated 90% consumption of machine and hand piles.

Assumptions used for determining emissions from timber operations and prescribed burns are:

- Emission factors used to determine effects from the project were taken from EPA Document 42 for prescribed burning, and from NEPA Air Quality Desk Reference Guide, Table 3.3.2-1 for timber harvest operations
- All harvest thinning equipment would be diesel powered.
- Harvest operations include harvesting, processing, skidding, loading, hauling, and road watering.
- Slash piles would be constructed free of dirt, with 90% consumption.

As displayed in Table 3-14, burning of piles in Alternative A would produce a total of 2155.52 tons of CO, 104.86tons of VOC, 117.10tons of NOx, and 233.03 tons of PM_{10}. Burning of piles in Alternative C would produce a total of 741.82 tons of CO, 36.09 tons of VOC, 40.30 tons of NOx, and 80.20 tons of PM_{10}. Underburning in Alternative A would produce emissions of 253.49 tons of CO, 14.08 tons of VOC, 11.32 tons of NOX, and 33.80 tons of $PM_{10.}$ Underburning in Alternative C would produce emissions of 180.73 tons of CO, 10.04 tons of VOC, 8.07 tons of NOX, and 24.10 tons of PM_{10} (Table 3-15).

Table 3-14. Criteria Pollutant Totals - Prescribed Burning (piles)

Alternative A

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	0	0	0	0
2	2155.52	117.10	104.86	233.03

Alternative C

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	0	0	0	0
2	741.82	40.30	36.09	80.20

Table 3-15. Criteria Pollutant Totals - Prescribed Burning (underburn)

Alternative A

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	0	0	0	0
2	253.49	11.32	14.08	33.80

Alternative C

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	0	0	0	0
2	180.73	8.07	10.04	24.10

Temporary and short-term visibility impacts can be expected in the immediate project area during actual ignition and would be affected by wind speed and direction. Drainage inversions would affect nighttime dispersal of smoke, with possible smoke effects 5 to 10 miles down canyon. Smoke from burning forest fuels can impact human health, particularly for the ground crews at the site. The localized effects of burning in the Plum project area would be short-term degradation of air quality from prescribed burning, primarily during the burnout stage and during nighttime canyon inversions. The prescribed pile and under burning associated with the selected alternative would be conducted in accordance with a smoke management plan approved by the Nevada Sierra County Air Quality Management District. The smoke management plan would prescribe weather conditions (mixing heights and transport winds) that would avoid, as much as possible, smoke effects in Alleghany and Forest City.

Predicted emissions from the Plum project timber harvest operations in Alternative A are 16.19 tons of CO, 1.75 tons of VOCs, 32.07 tons of NOx, and 2.09 tons of PM_{10}. Predicted emissions from the Plum project harvest operations in Alternative C are zero in all categories due to no commercial harvest operations. Dust created by logging, hauling operations, and tractor yarding can also affect PM_{10} concentrations. Dust abatement measures would be used to mitigate fugitive dust effects from these areas during implementation of the proposed action.

Table 3-13. Criteria Pollutant Totals - Timber Harvest Operations

Alternative A

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	16.19	32.07	1.75	2.09
2	0	0	0	0

Table 3-16 below displays the combined criteria pollutant emissions associated with commercial timber harvest (Alternative A) and prescribed burning (Alternatives A and C).

Table 3-16. Criteria Pollutant Project Totals - (Includes Commercial Timber Harvest and all Prescribed Burning)

Alternative A

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	16.19	32.07	1.75	2.09
2	2409.01	157.40	118.94	266.83

Alternative C

Year	CO (tons)	NOx (tons)	VOC (tons)	PM_{10} (tons)
1	0	0	0	0
2	922.55	48.37	46.13	104.30

If a wildfire event does occur after project implementation of the action alternatives (Alternatives A and C), concentrations of all smoke related emissions would be expected to be less than in Alternative B due to the reduced levels of fuel available. Prescribed burning activities for all projects are coordinated with the state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion of emissions. Therefore, expected effects of prescribed burning activities proposed under Alternatives A and C would not exceed state and local air quality standards.

Timber operations are estimated to take one operating season to complete. Burning of the prepared units would occur over a one to two year period after the first season of timber operations. Staging of the pile burning over this period would ensure compliance with federally mandated annual threshold levels for ozone precursors (VOC and/or NOx). The proposed action is in conformity with the state implementation plan and, therefore, further air quality analysis is not required.

Air Quality Effects of No Action

Under Alternative B, no increase in ozone precursors or PM_{10} emission levels would be produced from prescribed burning of activity generated fuels, harvest operations, or understory burning. Potential for substantial degradation of air quality from wildfire in the future as surface fuel deposition occurs would not be reduced. The No Action Alternative would not provide any opportunities to reduce existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation can exceed Federal and State standards as far as 50 miles downwind. Forest fuels would continue to increase with biomass production out-producing the decomposition rates in this climate. Long term chronic effects of wildfires include, higher PM_{10} emissions, mostly due to large areas of exposed soil and ash in the aftermath of a high intensity wildfire.

Forest Vegetation:

Alternative A - Direct Effects on Vegetation

Mechanical Thinning

The Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD 2004) allows reductions of up to 30 percent from existing canopy cover (SNFPA ROD, page 50), but it requires canopy cover retention of at least 50 percent in most situations. The SNFPA ROD does allow canopy cover to be reduced to 40 percent where site-specific project objectives cannot otherwise be met (SNFPA ROD, page 51). Canopy cover requirements apply to all mature forest habitat outside the Wildland Urban Intermix (WUI) Defense Zone.

The SNFPA ROD (page 50) specifies that within mature forest habitat outside the Defense Zone, projects would retain at least 40 percent of the existing basal area generally comprised of the largest trees. Implementing thinning under this direction would result in upper diameter limits of anywhere from 12 to 29 inches dbh. Where diameter limits are less than 29 inches dbh, trees up to 29 inches dbh would be removed to create ¼-acre gaps. In these situations, the 40 percent basal area retention would be made up outside of the gaps. No trees larger than 29 inches dbh would be removed unless determined to be hazard trees (see hazard tree marking guidelines in Appendix D of the EA). Additionally, except for equipment operability, no hardwoods would be removed. The SNFPA ROD (page 50) also specifies that where available, projects would be designed to retain 5 percent or more of the total treatment area in lower layers comprised of trees 6 to 24 inches dbh. Thinning prescriptions retain at least this amount in all stands.

Mechanical thinning is proposed where a more diverse stand structure (both vertically and horizontally) is desired, stand densities are high and considered at risk for insect attack, conifers are overtopping and suppressing black oak, and/or where overcrowded conditions may contribute to future wildfire intensity. Mechanical thinning would reduce ladder and crown fuels, resulting in an increase in the vertical and horizontal distance between tree crowns; however, in most areas clumpiness is encouraged. Where the opportunity exists, thinning would promote a more diverse

species composition in white fir dominated stands. Age class and size class diversity would also be encouraged where appropriate in even-aged or even-sized stands. Unless determined to be a safety hazard, snags and large downed logs would be retained.

Stand Structure

The objectives for thinning concentrate on enhancing structural diversity and horizontal heterogeneity. According to Jerry Franklin (2001), structurally diverse means that there is a rich variety of individual structures, including a variety of tree sizes, conditions, and species--including some large, old trees with their individualistic canopies, decadence, and large branch systems. Structurally diverse also means that there is a high degree of spatial variability in structure in both the vertical and horizontal dimensions. Horizontal heterogeneity means that there is a high degree of spatial patterning within the stands visible as structural patches, including canopy gaps (openings) and areas with high stem densities (Franklin 2001).

Often, thinning from below tends to create stands with uniformly-spaced trees. This type of structure does not meet wildlife or silvicultural (i.e. diversity or regeneration) objectives. The Plum project concentrates on creating a structurally diverse forest structure valuable to wildlife. It incorporates many of the recommendations from *An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests or* GTR 220 (North et. al 2009), which integrates a compilation of the best available science into suggestions for managing forest landscapes.

Recommendations from GTR 220 that are incorporated into the prescriptions include the following (prescriptions are available on request from the District Office):

1. Prescriptions would differ by species to retain hardwoods and favor pines especially on ridgetops and south facing slopes, increasing the forest's fire resiliency and improving habitat for wildlife.

2. Prescriptions would retain trees providing suitable structure for wildlife including large trees and trees with multiple tops, cavities, platforms, and other formations that create structure for nests and dens, such as those described in *Trees and logs important to wildlife in the interior Columbia River basin* (Bull et. al 1997).

3. Protection would be given to most large trees and snags from harvest and inadvertent loss owing to prescribed fire.

4. Hardwoods would be protected and enhanced whenever possible.

5. Light would be increased for understory shrub patch development, increasing habitat for some small mammals and birds.

6. Trees within a stratum would often be clumped, but different strata would usually be spatially separated for fuel reasons.

7. Drainage bottoms and north to northeast-facing slopes would generally retain greater tree densities and basal areas.

8. Thinning would be focused on removing firs and incense-cedar to promote a more fire resilient forested stand.

The above recommendations, along with other silvicultural and wildlife objectives, would be implemented through various methods. These methods include thinning conifers around individual and groups of black oak, creating small (1/4 acre) canopy gaps to let more sunlight reach the forest floor, retaining pockets of large trees, thinning smaller conifers around large trees, protection of pockets of forest regeneration, and leave buffers along streams. Thinning around healthy black oak and large conifers would not only enhance growth and crown development, but it would create more variability in tree distribution by creating canopy gaps around these trees. Additional canopy gaps would be located adjacent to large tree clumps or natural gaps caused by insect or disease related mortality. According to Agee and Skinner (2005), gaps impede fire spread and therefore may reduce fire severity in forests where high canopy cover groups are retained. GTR 220 states that stand structure reconstructions in mixed-conifer/ giant sequoia stands suggest a wide range of gap sizes with most less than 0.5 acres (Piirto and Rogers 2002).

During tree removal operations, some damage to residual trees would be unavoidable. Tree injuries could create opportunities for insects and disease. However, through careful logging practices that minimize both wounding of residuals and site disturbance, damage to residual trees would be minimal. Also, downed woody material or slash that is produced during thinning may promote the activity of *Ips spp.* (Owen 1991). Whole tree yarding to landings in tractor units would remove most of the slash along with the boles of the trees. Recommendations in aerially logged units are to lop and scatter (exposing to the sun) logging slash down to 3 inches in diameter and to less than 18 inches above the surface of the ground (Shea and Ostergaard 1997). The objective of this treatment is to dry out the phloem of the slash, thereby making it unsuitable for production of *Ips. spp*. brood (offspring). Some logging related slash would be utilized to create cover piles and log structures.

Plantations

Mechanical plantation thinning would reduce stocking levels to between 70 and 90 trees per acre in the older stands. Precommercial plantation thinning would reduce tree densities to between 90 and 150 trees per acre. Species other than ponderosa and Jeffrey pine would be favored in the selection of leave trees to improve species diversity. Hardwoods would be released from conifer competition where oaks are at least 2/3 of the height of surrounding conifers. Retention patches would be designated to promote stand structural diversity. Where needed, slash would be chipped within 50 feet of the road. In other areas, slash would be lopped and scattered, as needed. In older plantations, cut trees would be whole tree harvested and yarded to landings. No thinning would occur within the riparian buffers in RCAs.

The direct effects of plantation thinning would be to release black oak from conifer competition. In those units where brush cutting is also proposed, treatments would reduce surface and ladder fuels.

Plantation mastication

The direct effects of plantation mastication would be to reduce competition to conifers and black oaks from other competing vegetation.

Hazard Tree Removal

Hazard trees would be removed from within thinning units. The direct effects to vegetation of removing hazard trees would be minimal, consisting of some injury and breakage through falling and yarding operations.

Tractor Piling, Hand Thinning, and Underburning

Understory treatments would include tractor piling and burning, underburning, hand thinning of small less than 10" dbh trees and brush, and hand clearing of small conifers around oaks. Tractor piling would remove surface and ladder fuels by piling severed small conifers, brush, slash and debris to be burned during periods of low fire danger. Underburning would remove shrubs and small trees (mostly less than 4 inches dbh, but occasionally up to 8 inches dbh in dense pockets). Some overstory conifer mortality may occur in isolated areas because of cambial damage and torching, but mortality in larger trees would be minimal. Hand thinning treatments would remove small trees generally less than 10" dbh and shrubs. The cut material would be piled and burned. Hand thinning of trees and shrubs would reduce ladder fuels, and release the remaining trees from competition for water, soil nutrients, and sunlight. Hand clearing around oaks would remove conifers less than 10" dbh that compete with hardwoods for sunlight, water and soil nutrients. This treatment would help ensure oak presence as a part of the species composition in mixed conifer stands.

Effects of Prescribed Burning

Hardwoods

California black oak (*Quercus kelloggii*) is fire sensitive. The outer bark chars readily, and the cambium suffers heat damage even where bark is thick (Howard 1992). The amount of damage sustained by surface fire depends upon fire severity. A large percentage of black oaks are completely killed following severe surface fire. Moderate-severity fire typically produces localized charring and cambium death in an older trunk, while other trunk portions remain undamaged. A moderate-severity fire would kill approximately half of all young trees in a stand, while most others would be top-killed. Low-severity fire causes some cambium damage to trees pole-sized and under. Spring fires corresponding to the active growing season result in greater tissue damage than fire during other seasons (Howard 1992).

Underburning would reduce the vegetative competition and may result in seedling-sprouts more vigorous and of better form than the original seedlings. Fire would kill the advance oak reproduction back to ground line. The oak would probably sprout from the root crown, often with only one stem, and quickly grow back to browse height (Tappeiner and McDonald 1979).

Above ground foliage of canyon live oak (*Quercus chrysolepis*) is fire sensitive, and it is generally top-killed by fires of even relatively low intensity (Green 1980). Even light ground fires can seriously damage or girdle this oak (Plumb and McDonald 1981). It is its flaky outer bark that contributes to its destruction (Plumb and McDonald 1981). After fire, canyon live oak generally sprouts prolifically (Tesch and Hobbs 1986).

The underburning treatments would be designed to result in low vegetation burn severity effects. While some pole-sized black oaks could be killed, mortality of the majority of black oak trees in the underburned areas would be minimal.

Conifers

Underburning would benefit stand health by killing many suppressed understory trees, thus reducing ladder fuels and inter-tree competition. Additionally, underburning would help to increase structural diversity by producing a patchy kill pattern. Underburning would kill more incense-cedar, white fir, sugar pine, and Douglas-fir saplings than ponderosa pine because they have very thin bark comparatively. Damage to larger trees from underburning would be moderate in white fir dominated stands and minimal in stands with a more diverse species composition. Past experience with underburning in white fir stands has shown that the extent of fire related mortality is often not immediately apparent, but can continue for 10 or more years after burning. GTR 220 recommends that given their current deficit in mixed-conifer forest and the time necessary for their renewal, most large trees and snags should be protected from harvest and inadvertent loss owing to prescribed fire. Fire related mortality in larger trees can be mitigated somewhat by clearing away large fuels and raking back duff and bark sluff around tree boles or by creating a fireline around the tree bole below the dripline of the crown (Reardon et al. 2007). Conifers damaged by burning may later succumb to insects or disease.

Shrubs

Depending on the season and conditions of burning, most shrub species would only be top killed. After burning, recovery of these shrub species would occur mainly through sprouting.

Alternative A - Indirect Effects to Vegetation

Forest Health

In proposed thinning stands, tree health and vigor would improve resulting in an increased resistance to insects and disease, improved growth, less density related mortality, a more diverse stand structure, and a forest that is more resilient to disturbances including climate change.

The indirect effects of plantation thinning would be an increase in sunlight, moisture, and soil nutrients available for tree growth and enhanced wildlife habitat through developing diverse stand structure.

Hardwood Enhancement

In stands with a hardwood component, thinning of conifers from around black oak would increase the amount of sunlight reaching tree crowns, thus helping to ensure survival and promote better crown development and seedling establishment. North and others (2009) affirm that provisions are needed to create open areas within stands to facilitate hardwood recruitment. Additionally, they state that thinning around large oaks that are prolific seed producers creates open conditions that favor oak regeneration.

Large Tree Enhancement

Thinning around selected large diameter conifers (> 29" dbh) would increase growth and resistance to insects and disease. Recent studies in ponderosa pine stands in Oregon confirm that stand density reductions result in increased growth of large old trees. Furthermore, they show that a physiological response to stand density reductions can last for up to 15 years (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). Contrary to the belief of some foresters and scientists, this new information shows that at the individual level, old trees have the potential to increase growth dramatically after stand density reductions. Additionally, Waring & Pitman (1985) found a large increase in mountain pine beetle (*Dendroctonus ponderosae*) resistance of old lodgepole pine *(Pinus contorta)* stands within one year after thinning. What this means is that forest managers can effectively manipulate old-growth stands on an infrequent basis (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). The advantages to the old-growth ecosystems are that susceptibility to fires, insects, and drought can be mitigated, and tree-level productivity can be enhanced with minimal mechanical damage associated with the harvest (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). Increases in growth are not immediately apparent, however. This same study found that there was about a four-year lag period in growth response after thinning (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). The authors speculate that this lag is associated with increased root growth.

Structural Diversity

Development of complex canopies (vertical diversity) involves the establishment and growth of shade-tolerant tree species into the middle and upper canopy levels (Franklin 2001). Developing complex spatial patterning or structural patches within mature and early old-growth stands (horizontal heterogeneity) is largely the result of patchy or spatially aggregated mortality caused by diseases, insects, and wind (Franklin 2001). Alternative A allows flexibility to create the patchiness seen in natural old-growth stands. Prescriptions developed for Alternative A incorporate recommendations from GTR 220 and concentrate on improving structural diversity through creating small (1/4 acre) canopy gaps, preserving the natural clumpy structure within stands, and in some stands, creating a diameter distribution that approximates active fire forests, that is, a distribution of nearly equal numbers of trees in all diameter size classes (North et. al 2009).

After timber harvesting, artificial regeneration of landings would compliment both species and structural diversity goals.

Gaps

In Alternative A, gaps created through timber harvesting would generally not exceed ¼ acre in size, too small to provide sufficient sunlight to regenerate shade intolerant conifers (York et al. 2004). Kevin O'Hara (2005) found that in mixed species forests – that often have greater crown closure and higher LAI (Leaf Area Index) – group (opening) sizes must be sufficiently large to provide conditions where ponderosa pine has an advantage. Additionally, York et al. (2007) looked at the gap size threshold where significant height suppression can be avoided in the early growth of planted trees. York (2007) found that for both ponderosa pine and sugar pine, as gap size increased, height growth diminished after about .3 hectares (or about .75 acres). From this study, one could surmise that pine species need an opening of at least .75 acres for maximum early height growth (seven years in this study). Even though natural regeneration of shade tolerant conifers could occur within the proposed openings, the purpose for creating openings is not exclusively for conifer regeneration. The purpose of the proposed gaps is to increase structural diversity. Gaps also impede fire spread (Agee and Skinner 2005).

After harvesting, gaps would be left "as is", hand piled and burned within the gaps, or the remaining fuels would piled and burned outside of the gaps. Burning within gaps would stimulate stored seed to germinate resulting in *Ceanothus* regenerating in many of the gaps. Ceanothus is an important source of available nitrogen (Erickson et al. 2005, Oakley et al 2003) that persists even after the shrubs have been removed by fire (Oakley et al. 2003). North et al. (2009) recommends that in forests where shrubs are currently rare, it is important for managers to consider protecting what shrubs remain and increasing understory light conditions for shrub establishment and patch expansion. Additionally, conifers would regenerate from natural seed fall from primarily shade tolerant fir.

Canopy Cover

Canopy cover would meet or exceed 50 percent across the mechanical thinning units in all natural stands outside of the (WUI) Defense Zone after thinning. Except within openings, shrub growth should be minimal and short term in stands that maintain these levels of canopy cover. New shrub growth from stored seed would germinate in skid trails, gaps, and in areas that are underburned. Where thinning without understory treatment is prescribed, increases in shrub growth would generally be minimal and short term as tree crowns would quickly fill openings in the canopy. Around black oak and large conifers (> 29" dbh) and where small (1/4 acre) canopy gaps are created through thinning, more shrub growth would be expected, especially in mechanically treated and burned areas. The increased sunlight and decreased vegetative competition for water and soil nutrients in the openings created around large conifers and oaks would help them to become healthier and more vigorous and thus persist longer than without this treatment.

Development of Large Snags

Based on the previously mentioned studies in ponderosa pine stands (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003), thinning around large diameter pine can increase growth and health for up to 15 years with a lag period of about four years. Consequently, there could be at least a 15 to 20 year increase in longevity of large pine, or conversely, a 15 to 20 year delay in mortality

of large pine under proposed thinning treatments. A similar increase in longevity would be expected in other large diameter conifers such as Douglas-fir and Sugar pine.

Understory Treatments Effects on Vegetation Growth

Tractor piling, hand thinning, and underburning would increase the availability of water, sunlight, and soil nutrients available for tree growth. As a result, trees would be healthier and less likely to succumb to insect attack. The removal of brush and ladder fuels would increase stand resiliency to disturbances such as wildfire. In units where only shrubs and small trees are removed, decreased competition in the residual stand would encourage the growth of larger, more flame-resistant trees. New sprouting vegetation would provide palatable forge for wildlife.

Underburning Effects on Vegetation

After underburning, fire adapted species would regenerate. Species such as tan oak, chinquapin, huckleberry oak, Pacific dogwood, bitter cherry, greenleaf manzanita, and deer brush sprout vigorously from the root crown after burning. In species such as whitethorn, deer brush, and greenleaf manzanita, fire would also stimulate germination of buried seed. This new sprouting vegetation would provide palatable forge for wildlife.

Stand Density Index (SDI)

Stand Density Index (SDI) represents an effective tool with which to translate growing stock objectives into density management prescriptions. The utility of SDI results from the ability to compare levels of growing stock (and thus competitive stress, degree of site occupancy and growth as a percent of potential) regardless of differences in site quality or stand age. Thus, SDI was selected as the way to measure the effectiveness of the proposed treatments in regard to reducing the likelihood of insect mortality.

Jim Long (Smith and Long 2003) recommends using a maximum SDI of 600 (theoretical boundary line for a species) for mixed conifer stands on the Yuba River Ranger District. This maximum SDI reflects a desired condition that maintains some early seral species such as ponderosa pine in forested stands. The other maximum SDI used for this analysis was 800 for red fir based on those used in the mortality model for the Western Sierra Nevada Variant of FVS (Dixon 1994). Long (1985) suggests managing for an SDI of less than or equal to 60 percent of the maximum SDI for stands largely free from self-thinning. Additionally, the Regional Forester's letter (2004) states that when designing thinnings, ensure that density does not exceed an upper limit (90% of normal basal area, or 60% of maximum stand density index) to avoid the health risks associated with density. It also directs managers to "design thinnings to ensure that this level would not be reached again for at least 20 years after thinning." A lower level of 35 percent maximum SDI would maintain full site occupancy. The aim is to maintain stands between the upper and lower SDI levels of 35 and 60 percent maximum SDI to maintain stand health and productivity at optimal levels. Still other objectives, in addition to requisite 2004 SNFPA ROD standards and guidelines, such as maintaining high levels of canopy cover for wildlife habitat, can make these SDI goals difficult to achieve.

Effects on Stand Density Index (SDI)

FVS was used to compare SDI levels immediately after the proposed mechanical thinning treatments and then at 10-year intervals up to 30 years for all treatments (see Appendix D). SDI levels after thinning would be reduced to below 60 percent of maximum SDI on about 43 percent of the acres thinned. After 20 years, about 75 percent acres would be above the recommended density level.

Because of other management objectives such as canopy cover, basal area retention, and hardwood retention, SDIs in some stands would remain higher than recommended after thinning. However, the proposed treatments would meet Forest Plan standards and guidelines for mechanical thinning treatments as well as project objectives, as the primary intent is to move the project area toward the desired condition. While some of the area may not fully achieve the desired density levels after proposed treatments, most of the area would be in a healthier condition and less likely to suffer large losses to insect mortality. Additionally, project objectives aimed at increasing structural diversity would be met on all of the acres mechanically thinned.

Insects and Disease in Natural Stands

As recommended in the Regional Forester's letter (2004), where stands are maintained at or below the suggested 60 percent maximum SDI, risk for insect infestation is minimized. Sheri Smith, Zone Entomologist states that thinning is the most important silvicultural tool available to maintain or restore tree health and increase resistance to insect attack. However, because it places an additional stress on trees, thinning during non-drought periods is preferred rather than waiting until mortality is detected (Smith 1997).

While thinning increases the health of trees, it may aggravate disease conditions such as annosus root disease. Annosus root disease is a normal part of most forest ecosystems in the West contributing to structural composition and diversity. Studies have shown the incidence of annosus root disease to be higher in stands that were partially cut (Schmitt et al. 2000). Especially when thinning in white fir dominated stands, care must be taken to minimize wounding of residuals, which create entry sites for disease. Thinning white fir stands with annosus root disease may reduce disease impacts by increasing vigor in the residuals; however, this strategy has not been well researched (Schmitt et al. 2000).

To reduce the chance of new infection centers forming following harvest activity, it is recommended that a registered borate compound be applied to all freshly cut conifer stumps greater than 14" dbh. However, treatment of stumps is not recommended for stands already having high levels of annosus root disease infection. Furthermore, in the annosus root disease survey in the Washington Project Analysis (on file at the Yuba River District office), the pathologist recommended borate application only in stands with no indications of annosus root disease presence. Likewise, for this project only true fir stands with no indication of root disease would be treated with borate compound (see Chapter II, Table 2-5. Management Requirements).

Shrubs

Thinning would result in an increase in existing shrub growth primarily because of increased light levels, and especially within the ¼ acre openings where burning may occur. Additionally, ground disturbance on skid trails, in combination with increased light levels, would promote the germination of stored seed in some places. Similarly, underburning would stimulate germination of stored seed. Rate of growth for new shrubs would vary depending on species, canopy cover, and amount of light required by the plant for maximum growth.

Where underburning would occur along with thinning, growth of resprouting vegetation would be more aggressive than in areas only thinned. In areas tractor piled within thinning units, shrub response is expected to be minimal. Proposed canopy cover retention would suppress the growth of sprouts considerably in natural stands when compared to treatment areas without these levels of canopy cover.

Herbicide use, other than a fungicide (Sporax) used on stumps to control root disease, is not planned or anticipated for this area at this time.

Plantations

The indirect effects of plantation thinning would be increased tree health and growth levels, less density related mortality, enhanced wildlife habitat through developing older forest characteristics such as large diameter trees, more diverse stand structure, and more resiliency towards natural disturbance. The removal of brush and ladder fuels would help to increase survivability of trees in the event of a wildfire.

Hazard Tree Removal

The removal of hazard trees would increase the amount of sunlight reaching the ground along roads resulting in increased growth of shrubs and small trees.

Alternative B - Direct Effects to Vegetation

Thinning and understory treatments

Alternative B would not meet the purpose and need of enhancing forest health and wildlife habitat. Thinning of trees in natural stands, plantation thinning, hand cutting of brush and small trees, tractor piling, and mastication in plantations would not occur. Additionally, prescribed burns would not reintroduce fire into the landscape. Overstocked slow growing stands of trees would continue to experience reduced tree vigor and competition induced stress resulting in tree mortality. Stands with heavy ladder fuels and dense conifer and shrub understories that could contribute to crown fire initiation would persist. Consequently, the present condition within the Plum project area would not move closer to achieving the desired condition.

Plantations

Similar to natural stands, tree health would decrease in overcrowded plantations making them more susceptible to insects and disease. Additionally, as tree canopies close, shrubs would eventually succumb to competition for site resources. Consequently, dead trees and shrubs would add to the future surface fuel loadings.

Hazard Tree Removal

Hazard trees would not be removed. The direct effects of not removing hazard trees would be that snags and defect trees would continue to exist within units along roads.

Alternative B - Indirect Effects to Vegetation

Forest Health, Hardwoods, Large Trees and Snags

In natural stands and plantations, stand densities would continue to increase in the absence of wildfire or other major disturbance. Growth would continue at progressively reduced rates and density related mortality would increase. Where openings in the canopy exist, canopy cover would gradually increase resulting in a reduction of shrubs. In the absence of disturbance, black oak would continue to decline because of lack of sunlight. While this process naturally occurs over time until some type of disturbance occurs (insects, disease, fire, or blowdown), in many cases it is desirable to retain black oak as a component of the stand for structural diversity and other wildlife habitat values. Structural diversity would slowly improve over time as large trees die and create gaps for regeneration. Increased mortality in large trees would result in an increased number of large snags available for wildlife habitat. Because of the limited amount of sunlight reaching the forest floor in tree fall gaps, most regeneration would be shade tolerant species such as true fir. True fir is less able to tolerate drought or fire than the less shade tolerant pine or Douglas-fir. Tree mortality in overcrowded stands would lead to increased surface fuel loadings as stand densities continue to increase.

Structural Diversity (including gaps)

Over time, mortality would occur in small patches creating increased horizontal diversity. As previously mentioned, gaps would fill in with mostly shade-tolerant tree species such as true fir. Smaller shade tolerant trees would continue to grow up into the canopies of larger trees creating increased vertical diversity. While structural diversity would improve over time, conditions would become ideal for crown fire initiation.

Canopy Cover

Generally, there would be little change in canopy cover over the next 20 years (see table in Appendix D of the EA) in the absence of wildfire or other widespread natural disturbance.

Stand Density Index (SDI)

Currently, over 90 percent of the area proposed for thinning is over the threshold (60% of maximum SDI) where competition induced mortality begins (Smith and Long 2003). In 20 years, 100 percent of the natural stands proposed for thinning would exceed recommended stand density levels. As a result, numbers of snags and downed logs would increase, as would surface fuel loadings. This increase in snags would include both large and small snags. Thus, Alternative B would result in the creation of snags at a faster rate than the action alternatives.

Insects and Disease in Natural Stands

Without thinning, it is likely that insect mortality would increase as stand density increases. The insects most likely to become problematic in natural stands within the project area are the fir engraver (*Scolytus ventralis*) and bark beetles, specifically the western pine beetle (*Dendroctonus brevicomis*). Bark beetle and engraver beetle related mortality occurs primarily in "groups" of trees with the bark beetles or as single trees scattered over several acres with the fir engraver (Smith 1997). Successful attacks by the fir engraver can result in top-kill, branch kill, patch kills along the bole, and/or whole tree mortality. The fir engraver is the primary agent of mortality in white and red fir dominated stands. Under adequate moisture regimes, overstocking of fir stands and high infection rates by root disease are the principle factors involved in predisposing trees to attack (Smith 1997). On the west side of the Sierra Nevada, most fir engraver-related mortality occurs during prolonged periods of drought. Successful attacks by the western pine beetle result in death of the host tree. Often, groups of trees are killed, especially when growing under crowded conditions. Since larger trees are generally preferred, the western pine beetle can dramatically alter the character of a forest that comes under attack (USDA 2008).

Annosus root disease would continue to infect true fir, creating pockets of mortality of varying sizes, which would contribute to within stand structural diversity.

Shrubs

Shrub growth would decrease in some areas and increase in others. Shrub growth would decrease and shrubs would eventually die as tree canopies close in areas that were once open. Conversely, shrub growth would increase within the openings created from tree mortality.

Plantations

Within plantations, growth would slow and density related mortality would increase. Densely stocked plantation trees would become increasingly susceptible to insects as stress from competition for resources increases. Additionally, as tree canopies close, shrubs would eventually succumb to competition for site resources. Consequently, dead trees and shrubs would add to surface fuel loadings.

Hazard Tree Removal

Hazard trees along system roads within thinning units would continue to deteriorate and fall.

Alternative C - Direct Effects to Vegetation

Thinning and Understory Treatments

Alternative C complies with the requirement to include a noncommercial funding alternative at the project level. This alternative's sole purpose is to achieve the fuels reduction element of the purpose and need. The direct effects of Alternative C would be the same as Alternative A for those areas where only fuels treatments are proposed. Where both mechanical thinning and fuels treatments in Alternative A overlap, the effects would differ in Alternative C, with only the fuels treatments implemented under Alternative C. For all other areas, the effects of implementing Alternative C would be the same as Alternative A.

Stand Structure

One of the primary differences between Alternative C and Alternative A is the stand structure resulting from thinning. Alternative C prescriptions would only remove ladder fuels through thinning trees less than 10 inches dbh (or to the extent necessary for operability). These prescriptions tend to create single storied stands with little structural diversity and a continuous overstory canopy layer. In contrast, Alternative A attempts to create and enhance stand structural diversity through the creation of clumps and gaps in the forest canopy.

Plantations

The effects to plantations proposed for thinning in Alternative C would be the same as Alternative A.

Hazard Tree Removal

Hazard tree removal would have the same effects as Alternative B.

Tractor Piling, Hand Thinning, Mastication and Underburning

The effects of understory treatments (tractor piling, hand thinning, mastication and underburning) in Alternative C would be the same as in Alternative A. Where mechanical thinning and understory fuels treatments are proposed in the same unit in Alternative A, understory treatments would still be implemented under Alternative C. The direct effect would be a reduction in surface and ladder fuels.

Alternative C - Indirect Effects to Vegetation

Hand Thinning

In areas with primarily shrubs and small trees, decreased competition in the residual stand resulting from hand thinning of small trees would encourage the growth of larger, more flame-resistant trees. Treatments would also address the immediate fuels hazard in these areas.

In Alternative C, tree health and vigor would improve (but not to the degree expected under Alternative A), resulting in an increased resistance to insects and disease, improved growth rates, and less density related mortality then if no treatments were to occur.

All Understory Treatments

Where only fuels treatments are proposed in Alternative A, the indirect effects of understory treatments (tractor piling, hand thinning, mastication and underburning) in Alternative C would be the same as those described under Alternative A. In areas where both mechanical thinning and understory treatments are proposed in Alternative A (refer to Table 1-6 in Chapter I), the understory treatments proposed under Alternative C would improve tree health and resistance to insects, but to a lesser degree.

Structural Diversity

Because only trees under 10 inches dbh would be removed, Alternative C does little to improve structural diversity. Hence, Alternative C would not meet structural diversity objectives as well as Alternative A. Alternative C would improve structural diversity more than Alternative B, however.

Canopy Cover

After treatment, canopy cover would meet or exceed 50 percent in all understory treatment units that overlap with thinning units in natural stands outside of the (WUI) Defense Zone. Within mechanical plantation thinning units, at least 40 percent canopy cover would be maintained outside of the (WUI) Defense Zone. Shrub growth would be minimal and short-term in stands that maintain these levels of canopy cover. New shrub growth from stored seed would germinate in skid trails and in areas that are underburned.

Stand Density

Post treatment stand density differs between the alternatives within stands proposed for tree removal. While thinning would result in increased tree health and vigor, the increase would not be as great both within stands and at a landscape scale in Alternative C (see table in Appendix D of this EA). Alternative C would improve health and vigor of trees over a greater area than Alternative B, however.

SDI Comparison of Alternatives A, B and C

FVS was used to compare SDI levels for the three alternatives immediately after thinning, and then again at 10 and 20 years after all mechanical treatments have been implemented. For the comparison, maximum stand density indices (max SDIs) of 600 (mixed conifer) and 800 (red fir) and the Regional Forester's recommendation to keep stands at or below 60 percent maximum SDI were used as a measure to maintain tree health and resistance to insect attack.

Differences between the alternatives were apparent immediately after thinning and at 20 years after thinning (see chart in Appendix D). When looking at the natural stands where both thinning and

hand thin/tractor pile are proposed in Alternative A (Units 11, 15 and 17), and only hand thin/tractor pile is proposed under Alternative C (Units C, D, E and H), Alternative C would reduce SDI to the recommended levels on about 10 percent of the acres originally proposed for thinning in Alternative A. After 20 years, all of the treated acres in the natural stands in Alternative C would be over the threshold of 60 percent max SDI. Alternative A reduces SDI levels to the recommended levels on 43 percent of the proposed thinning acres. About 25 percent of Alternative A's proposed thinning acres would be at or below the recommended density levels after 20 years. For Alternative B, over 90 percent of the area proposed for thinning is currently over the threshold (60% of maximum SDI) where competition induced mortality begins (Smith and Long 2003). In 20 years, 100 percent of the natural stands proposed for thinning would exceed recommended stand density levels.

Based on this analysis, Alternative A would best meet the Regional Forester's recommendations for density management and the Plum Project's objectives for reducing stand density.

Shrubs

The indirect effects of proposed treatments on shrubs would be similar to Alternative A within all treated areas except where mechanical thinning treatments are proposed in Alternative A that do not overlap with fuels treatments proposed under both Alternatives A and C. In these areas, shrub growth may tend to be faster in Alternative A within stands having lower post-treatment canopy cover. As in Alternative A, herbicide use is not planned or anticipated for this area at this time.

Plantations

The effects to plantations proposed for treatment in Alternative C would be the same as Alternative A. The effects to plantations not proposed for treatment in Alternative C (700006, 700051, 700054, 750001, 750002) would be the same as Alternative B.

Hazard Tree Removal

Hazard tree removal would not be implemented in this alternative. Alternative C would have the same effects as Alternative B.

Threatened, Endangered, Proposed, or Sensitive Plants and fungi:

No threatened, endangered or proposed plants have been found in the surveys of the Gold Project area.

Sensitive plant/fungi species: The project area contains an occurrence (several locations) of the Region 5, Regional Forester's sensitive plant species, *Lewisia kelloggii* ssp. *hutchisonii.*

Mitigation for *Lewisia kelloggii* ssp. *hutchisonii*: Buffer the occurrence locations by 100 feet to eliminate impacts from the proposed actions.

Mitigation for all sensitive plant habitats: The introduction of weeds (from implementation of the project) would be prevented by washing all equipment before it was used in the project area if it was

coming from an area that has weeds, to prevent introduction of noxious/invasive exotic weeds. In addition, only weed free plant materials would be used for erosion control (if needed) to prevent introduction of noxious/invasive exotic weeds. Several manual weed treatments are planned in the project area to reduce spread of weeds form existing weed occurrences. Scotchbroom occurrences would be annually treated in 2011 and annually thereafter until the seed stored in the soil was exhausted. Areas containing Scotchbroom would not be burned during prescribed burning operations to avoid stimulation of Scotchbroom seed stored in the soil. Seedlings of tree-of-heaven would be pulled in unit 15 and twice per year to control expansion of this invasive tree. Existing Himalayan blackberry occurrences would be avoided to reduce its spread; except when it occurs at stream crossing improvement areas where it would be hand pulled.

Overall

Tahoe National Forest Land and Resource Management Plan (Tahoe LMP) standards and guidelines and project specific mitigation measures have been designed to reduce any adverse impacts. Beneficial effects were not used in this analysis or supporting analyses to offset or compensate for adverse effects. No adverse effects of this project would be significant, even when considered separately from the beneficial effects that may occur in conjunction with those adverse effects.

2. The degree to which the proposed action affects public health or safety.

Prescribed fires produce smoke, which may have negative effects on sensitive people, generally the elderly and young children. There is some risk of fire behavior that exceeds prescription parameters and may be difficult to contain, but project design standards and management actions meet the safety requirements established for National Forest System lands.

Additionally, hazard trees would be removed along Forest Service system roads and within, or immediately adjacent to (tree felling distance), high-use recreational and administrative sites. The direct effects of removing hazard trees would be that roads would be safer for travel, and administrative or high use recreational sites would be safer for forest visitors, residents, and Forest Service employees.

The proposed actions would have no other effects to public health and safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

Historic/Cultural Resources- The Plum Project area is near historic and/or prehistoric sites, but project actions have been designed to avoid cultural resource sites eligible for inclusion in the National Register of Historic Places, with the result that there would be no direct or indirect effects to any cultural resources eligible for inclusion in the National Register. Project actions would fully comply with the National Historic Preservation Act (NHPA), and implementing programmatic agreements (PAs).

Parklands- There are no parklands within the project area.

Prime Farmlands- There are no prime farmlands within the project area.

Wetlands- The project area contains riparian (wetland) plant communities associated with seeps, springs, and fens/peatlands that may be impacted by prescribed burning. Direct ignition of fuels would not occur within 100 feet of these plant communities. Significant impacts to these wetlands are not expected with implementation of the project's management requirements for protecting water quality, riparian areas, and aquatic resources. (Refer to Chapter II, Table 2.1. Management Requirements). Thinning and mastication would not impact these wetlands directly, indirectly, or cumulatively.

Wild and Scenic Rivers- There are no Wild and Scenic Rivers designated within the project area.

Ecologically Critical Areas- There are no ecologically critical areas within the project area.

4. The degree to which the effects on the human environment are likely to be highly controversial.

The effects of this project on the quality of the human environment are not likely to be highly controversial. The project was subject to extensive analysis and planning, in addition to requiring the implementation of best management practices (BMPs), mitigation measures, and management requirements listed elsewhere in this document and in the project record. This has resulted in a limited and focused proposed action, which incorporates public concerns into the proposed action.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The proposed actions are routine tasks implemented on a regular basis by the Tahoe National Forest without incurring significant impacts. The results or effects of these actions on the human environment are predictable and known, based on similar past practices. The management requirements, mitigation measures, and best management practices included in the action alternatives, as described this document and the project record would also reduce and minimize any impacts or risks that might have otherwise been uncertain, unique, or unknown.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

The proposed actions or any of the alternatives would not establish a precedent for future actions, nor would it represent a decision in principle about a future consideration for other similar projects. Any future decision to treat the same or adjacent areas would be analyzed separately and on its own merits to determine a course of action. Future projects would require additional site-specific analysis and separate decisions as required under NEPA.

There are no future activities (maintenance) planned within this project. The concept of strategic treatments is not maintenance of a static pattern of treatment areas, but instead, the intent is to maintain a mosaic of both naturally-occurring and managed areas in which fuels have been modified so as to effectively interrupt the spread of a large wildfire.

While this project neither proposes, nor schedules, future actions in any of these areas, this document does not prevent the opportunity for future management actions.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions and risks, while ignoring the important residual effects of past natural events, may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present

effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to informed decision-making. (40 CFR 1508.7)"

For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Design features included in the proposed action would avoid, minimize, or reverse adverse cumulative watershed effects and minimize impacts to rare plants, wildlife, aquatic species, and other sensitive resources to the extent that any residual effects would not be cumulatively significant. Biological Evaluations and a Watershed Effects Report that disclose cumulative effects, as well as direct and indirect effects, are in the project file and available from the Yuba River District office.

Evaluation of Cumulative Effects:

A cumulative effect is the consequence on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the actions occur.

i) Cumulative effects on soil productivity.

Alternative A - The cumulative effects assessment area for the soils resource is bounded in space within the proposed activity areas, because this is where the full extent of soil disturbing activities takes place. The cumulative effects analysis is bounded in time the extent to which the soil resource would be expected to recover from potential impacts. For soil cover impacts, the temporal scale for effects would be relatively short (5 to 10 years) because inputs to soil cover are readily available from the vegetation remaining in and around the treatment units and because the treatments would leave sufficient soil cover, as described above under direct and indirect impacts. The temporal scale for assessing cumulative effects on soils from compaction and soil organic matter would be longer (decades) because these effects linger; hence, recovery is longer.

There has been recent management activity within the Plum Project area. However, the cumulative watershed effects disturbance mapping does not show recent (<20 years) activity within the proposed tractor thin activity areas, with the exception of Unit 15, which received a thinning treatment in 2002. Some of the proposed underburn activity areas have had past management;

evidenced by fact the soils are windrowed. There are no reasonably foreseeable future actions identified for the proposed activity areas.

Alternative A would not produce any significant amount of adverse direct or indirect soil impacts. Therefore, Alternative A, in combination with the effects of past, present, and reasonably foreseeable future actions described above, would not produce adverse cumulative effects. Based on minor residual compaction resulting from past action within the activity areas and no other present actions occurring and no reasonably foreseeable future actions planned within these areas, the proposed action, in combination with the effects of past, present, and reasonably foreseeable future actions, would not produce adverse cumulative effects on soils.

Alternative C -

The cumulative effects assessment area for the soils resource is bounded in space within the proposed activity areas, because this is where the full extent of soil disturbing activities takes place. The cumulative effects analysis is bounded in time the extent to which the soil resource would be expected to recover from potential impacts. For soil cover impacts, the temporal scale for effects would be relatively short (5 to 10 years) because inputs to soil cover are readily available from the vegetation remaining in and around the treatment units and because the treatments would leave sufficient soil cover, as described above under direct and indirect impacts. The temporal scale for assessing cumulative effects on soils from compaction and soil organic matter would be longer (decades) because these effects linger; hence, recovery is longer.

There has been recent management activity within the Plum Project area. However, the cumulative watershed effects disturbance mapping does not show any recent (<20 years) activity within the proposed tractor thin activity areas, with the exception of Unit 15, which received a thinning treatment in 2002. Some of the proposed underburn activity areas have had past management; evidenced by fact the soils are windrowed. There are no reasonably foreseeable future actions.

Alternative C would not produce any significant amount of adverse direct or indirect soil impacts. Therefore, Alternative C, in combination with the effects of past, present, and reasonably foreseeable future actions, would not produce adverse cumulative effects. Based on minor residual compaction resulting from past action within the activity areas and no other present actions occurring and no reasonably foreseeable future actions planned within these areas, the proposed action, in combination with the effects of past, present, and reasonably foreseeable future actions, would not produce adverse cumulative effects on soils.

ii) Cumulative watershed effects.

Ground-disturbing activities can cause both direct and indirect effects that persist through time. The cumulative result of all these effects is the potential to adversely affect downstream beneficial uses of the water. Cumulative watershed effects (CWE) analysis may reveal that even though the proposed activities themselves may not be sufficient to substantially impact the watershed, when analyzed in connection with past and future activities, they may become a cause for concern.

Cumulative watershed effects are the combined effects of past, present, and future land management activities within a watershed that may affect the watershed's hydrologic structure or process. The Forest Service's Pacific Southwest Region uses a standardized analysis process to assess the potential risk of cumulative watershed effects resulting from management activities (FSH 2509.22). There are two parts to CWE analysis: 1) determination of the Threshold of Concern (TOC) and 2) assignment of Equivalent Roaded Acre (ERA) coefficients to activities.

This cumulative watershed effects analysis compares (a) the existing level of land disturbance within a watershed with (b) an estimate of the upper limit of watershed tolerance to disturbance, referred to as the Threshold of Concern (TOC). The level of land disturbance is measured using Equivalent Roaded Acres (ERAs), whereby all disturbances are equated to an acre of road. The cumulative watershed effects analysis then recovers these disturbances over some period of time following a specified recovery curve. The existing ERA of a watershed is compared to the TOC to provide an assessment of the potential for cumulative watershed effects.

The ERA/TOC model provides a simplified accounting system for tracking disturbances that affect watershed processes; in particular, estimates in peak runoff flows influenced by ground-disturbing activities. Unlike the surface erosion model (USLE), ERA/TOC is not intended to be a process-based sediment model. It does, however, provide an indicator of watershed conditions.

Two critical parts of the CWE analysis process include: (1) determining the Threshold of Concern (TOC) for each affected watershed and (2) assigning Equivalent Roaded Acre (ERA) coefficients and recovery curves to different types of natural resource management activities.

Thresholds of Concern: The Tahoe National Forest has developed a standard method for determining watershed TOC values based on several factors. Each watershed is assessed for its ability to withstand erosional processes and handle sediment delivery to stream channels. The assessment is based on climatological, geologic and soils information, on-the-ground surveys of the stream channels and upland areas; and the experience and knowledge of current and previous TNF hydrologists. A range of TOC values, from a high of 0.18 (18%) to a low of 0.09 (9%), have been established for each 7th field Hydrologic Unit Code (HUC) watershed on the Forest, using the watershed assessments, soil porosity guidelines in the Forest Plan, and literature review of research on impacts of timber harvesting activities on sediment production.

Coefficients and Recovery Curves: ERA coefficients assigned to the Plum Project range from 0.30 for the combination of hand thinning, tractor piling, and pile burning; 0.20 for ground-based mechanical thinning and ground-based mechanical plantation thinning; 0.10 for aerial thinning and mechanical mastication; and 0.05 for helicopter thinning and underburning. Coefficients have been developed based on soil monitoring results, literature reviews, and consultation with other hydrologists. A 30-year straight line recovery rate is used for this analysis.

The spatial cumulative effects boundary considered in this analysis is the seven HUC7 watersheds listed in Table 5 below. This spatial boundary was selected because it includes all of the watersheds affected by the Plum project, thereby ensuring the analysis captures potential adverse effects by the proposed project. The temporal boundary is approximately thirty years for past projects (based on the assumed recovery period for land disturbing activities) and any known, foreseeable projects that

have enough detail to reasonably analyze in the CWE analysis. Past and present Forest Service vegetation and fuels management projects and timber harvests on private lands were included in the cumulative watershed effects analysis. The Plum Watershed Disturbance Map and supporting tables are a part of the project record.

Cumulative Effects of Alternative A (Proposed Action) and Alternative C (Noncommercial Funding Alternative)

By restricting ground-based equipment to slopes generally less than 30 percent and utilizing aerial systems in the remaining area, compaction and disturbance of soils in the project area would be minimized. These actions would also reduce the risk of erosion and sediment movement. The RCAs in the project area and activities within RCAs are consistent with the Sierra Nevada Forest Plan Amendment (Framework) and were set to protect and restore aquatic, riparian, and meadow ecosystems. Implementing the proposed action alternatives, with the specified management requirements, would result in a low risk of negative cumulative watershed effects.

This project is designed to protect watershed values by reducing potential direct and indirect effects associated project activities, such as erosion and sedimentation and protecting sensitive lands while meeting other resource objectives. By reducing the direct and indirect effects, cumulative effects would also be reduced under Alternatives A and C. The Threshold of Concern (TOC) and Equivalent Roaded Acres (ERA) by Drainages are displayed in the tables below.

Table 3-17. Cumulative Watershed Effects Analysis Percent ERA by Alternative

			ALT. A	ALT. B	ALT. C
			Proposed Action	Existing Condition/ No Action	Noncom. Funding
Drainage Name	**Acres**	**% TOC**	**% ERA**	**% ERA**	**% ERA**
Middle Yuba River-Indian Creek	7,053	13%	7.5%	7.3%	7.4%
Middle Yuba River-Moores Flat Creek	8,208	11%	5.2%	5.0%	5.0%
Headwaters Oregon Cr.	5,205	13%	5.7%	5.0%	5.7%
Oregon Creek-Miller Creek	5,657	12%	6.8%	6.0%	6.3%
Upper Kanaka Creek	5,458	12%	6.1%	4.4%	5.1%
Lower Kanaka Creek	6,044	12%	7.1%	3.5%	5.6%
Wolf Creek	5,551	12%	5.6%	5.0%	5.6%

Table 3-18. Cumulative Watershed Effects Analysis ERA/TOC Ratio by Alternative

			ALT. A	ALT. B	ALT. C
			Proposed Action	Existing Condition/ No Action	Noncom. Funding
Drainage Name	**Acres**	**% TOC**	**ERA/TOC**	**ERA/TOC**	**ERA/TOC**
Middle Yuba River-Indian Creek	7,053	13%	0.58	0.56	0.57
Middle Yuba River-Moores Flat Creek	8,208	11%	0.47	0.46	0.46
Headwaters Oregon Cr.	5,205	13%	0.44	0.39	0.44
Oregon Creek-Miller Creek	5,657	12%	0.57	0.50	0.53
Upper Kanaka Creek	5,458	12%	0.51	0.37	0.43
Lower Kanaka Creek	6,044	12%	0.59	0.29	0.47
Wolf Creek	5,551	12%	0.47	0.42	0.47

Risk to cumulative watershed effects for Alternative A:

Low risk Drainages include: Middle Yuba River-Moores Flat Creek, Headwaters Oregon Creek, and Wolf Creek.

Moderate risk Drainages include: Middle Yuba River-Indian Creek, Oregon Creek-Miller Creek, Upper Kanaka Creek, and Lower Kanaka Creek.

High risk Drainages include: None.

Very High risk Drainages include: None

Low Risk = (%ERA/TOC less than 0.50)
Moderate Risk = (%ERA/TOC = 0.50 - 0.79)
High Risk = (%ERA/TOC = 0.80 - 0.99)
Very High Risk = (%ERA/TOC = 1.00 or greater)

Table 3-18 shows the ERA/TOC ratio before the Plum project and the changes in the ERA/TOC ratios occurring from the proposed action. Before the project, five HUC7 drainages are less than 50 percent of TOC and therefore have a low risk of negative cumulative watershed effects. Two HUC7 drainages, Middle Yuba River-Indian Creek and Oregon Creek-Miller Creek, are above 50 percent

of TOC before the project and therefore are at moderate risk of negative cumulative watershed effects. No HUC7 drainages exceed 80 percent of TOC before the proposed project. The cumulative watershed effects analysis for Plum project shows increases in the ERA/TOC ratios in all of the HUC 7 drainages under the action alternatives; however, all are projected to remain well below the 80 percent ERA/TOC ratio under implementation of either of the action alternatives. None of the drainages are expected to exhibit negative cumulative watershed effects due to the management activities that are a part of the project proposal. The management requirements and the State mandated BMPs have been successfully used on many projects both on the Tahoe National Forest and other forests in California to protect water quality.

The RCAs in all drainages were set to reduce the risk of sediment delivery to the streams. Implementing the action alternatives (Alternatives A and C), with the specified management requirements, would result in a low risk of negative cumulative watershed effects.

Alternative B (No Action)

Under Alternative B, existing conditions in the seven HUC7 drainages would continue to proceed through natural processes. Natural processes include: hill slope erosion and stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. Alternative B would have both positive and negative impacts on watershed conditions. One positive outcome of the No Action Alternative is that no short-term ground disturbance would occur, thus reducing the potential for increased sediment transport to streams, loss of soil cover, or adverse impacts on riparian or aquatic habitats. The No Action Alternative would also preclude opportunities that could benefit watershed resources, such as thinning overstocked stands of trees, restoring aspen stands, reducing fuels accumulation by underburning and mastication, and improving portions of the road system that are currently delivering sediment to the stream system.

Alternative B (No Action Alternative) represents the existing condition in the drainages including activities on private land. No drainages are projected to exceed the TOC under implementation of Alternative B.

iii) *Cumulative effects on wildlife, aquatic species, and threatened, endangered, or sensitive plant species*.

Wildlife/Aquatics: Cumulative effects to wildlife consider the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects to fish, wildlife, and rare plants are discussed in detail in the following project documents, which are incorporated by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates, (2) Biological Evaluation for Plants and Fungi, and (3) Management Indicator Species (MIS) Assessment. These documents are located in the project file and are available upon request from the Yuba River Ranger District office. The analyses in these documents consider past, present and reasonably foreseeable effects within the analysis area. In general, the cumulative effects analysis area for wildlife includes the project area, and in some cases, expands to include sixth-field watersheds or beyond, to include the home ranges of wide-ranging animals such

as forest carnivores, raptors like the California spotted owl, and deer that may use the analysis area as a regular part of their home range, or for movement, migration and dispersal.

The temporal period selected for changes in vegetation from logging include a time period since 2001, which includes the best available data layers to complete this analysis in GIS. A qualitative assessment comparing the layers used against additional information (disturbance layers, aerial photos, vegetation maps from the 1980s), did not show meaningful changes that would warrant a different time frame.

In addition to the Plum Project, the following factors may affect wildlife:

Disturbance Related to Human Presence— The town of Alleghany is residentially developed private land located in the middle of the project area. The Sierra County General Plan limits residential development outside of core community areas, and little development has occurred on private land in the past 10 years. Forest City lies approximately 1 mile north of this project area, where several trails are popular for mountain biking occur in the northern portion of the project area. The project area includes the Lafayette Ridge OHV trail. Alleghany and Forest City have a rich mining heritage that attracts small mining operations; additionally, dredging and prospecting occur throughout the project area.

Disturbances Related to Road Density— Existing road densities range from one to 6 miles of road per square mile. This project proposes to decommission approximately 7.2 miles of roads that are spread out across the analysis area, which would reduce cumulative effects to wildlife from human disturbances.

Timber harvest on Public and Private Lands— This project area lies within the Area of Concern in the Tahoe National Forest for its uncertainty in maintaining spotted owl habitat, identified by Verner et al. (1992). The Area of Concern was identified because of the checkerboard patterns of private and public land ownership, where different management actions fragment late-successional habitats.

Private land comprises approximately 30% (5,683 acres) of this analysis area. Since 2001, logging on private land has removed approximately 493 acres of mid- to late-seral habitats. In contrast, logging on National Forest System land has emphasized the maintenance of suitable habitat for late-successional-associated species while still realizing some benefit to tree health and economic return by thinning out over-stocked stands. As a result, no mid- to late-seral habitats have been removed on National Forest System Land since 2001 within this project area.

The wildlife Biological Evaluation discusses the potential direct, indirect, and cumulative effects to late successional habitat and federally protected and sensitive species in detail. It concludes that Alternative A may add cumulative effects to sensitive wildlife species associated with late-successional habitats, but the degree of these effects are small because: (1) Overall habitat quality and quantity are maintained within the analysis area, and (2) No habitat characteristics are removed to a degree where effects would be expected to limit populations. Cumulative effects of Alternative C on habitats for sensitive wildlife species associated late-successional conditions would be less than under Alternative A. None of the action alternatives would result in irreversible or irretrievable effects to wildlife.

There are no direct or indirect effects to any federally endangered, threatened, or proposed wildlife species, so there are no cumulative effects from this project. As disclosed in the Plum Project Biological Evaluation, none of the action alternatives would lead to a trend toward listing for any Region 5 Forest Service Sensitive species—California spotted owl, northern goshawk, Pacific fisher, American marten, California wolverine, pallid bat, Townsend's big-eared bat. As disclosed in the Plum Project MIS Report, none of the action alternatives would alter existing forest-wide trends of the selected MIS species—fox sparrow, mountain quail, mule deer, California spotted owl, American marten, and northern flying squirrel.

Threatened, Endangered, or Proposed Plants: No threatened, endangered or proposed plants have been found in the surveys of the Plum Project area.

Sensitive Plants and fungi: The project area contains an occurrence of the Region 5, Regional Forester's sensitive plant, *Lewisia kelloggii* ssp. *hutchisonii*. Mitigations will be implemented to avoid any affects to these sensitive plants. No other present or reasonably foreseeable future actions will directly or indirectly affect these plants; hence, no adverse cumulative effects are expected.

iv) *Cumulative effects on forest vegetation.*

Alternative A - Cumulative Effects to Vegetation

The cumulative effects analysis for vegetation includes the land area encompassing Alternative A's treatment units. The area of cumulative effects was bounded in this manner because unlike wildlife or water resources, vegetation is stationary and the full extent of vegetation modification would take place within the treatment units. Vegetation changes at a broader landscape scale are assessed in cumulative effects analyses of habitats for wide-ranging animals such as forest carnivores, raptors like the California spotted owl, and deer, as described under the wildlife section above.

Twenty years was chosen as the cumulative effects timeframe based on the timeframe specified in the letter from the Regional Forester entitled "Conifer Forest Density Management for Multiple Objectives" dated July 14, 2004 (in project file) and because historically treatments have been effective for 20 years in this area. A threshold level of 60 percent of a maximum stand density index (SDI) was chosen based on recommendations by Jim Long (Smith and Long 2003). The desired condition for vegetation is based on the Forest Plan (SNFPA ROD 2004) desired conditions for land allocations, recommendations from GTR 220, and the desired conditions stated in the Plum Project Scoping Letter. Baseline levels were determined from existing condition and historic accounts (Leiberg 1902).

Past, Present and Foreseeable Future Projects

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Within the last 20 years, there were two previous entries into two of the natural stands proposed for thinning. Both of these entries occurred in 2002, and both of the entries were for thinning treatments. The units affected were unit 15 where 53 acres of thinning overlapped with the current stand and unit 7 where 21 acres of thinning overlapped with the current proposed treatment area. The cumulative effects of these treatments and those currently proposed, are not expected to negatively affect vegetation. The proposed treatments are expected to improve conditions for hardwoods and pines by reducing competition for sunlight, water, and soil nutrients.

There are no other known vegetation-related projects currently being planned or implemented within the proposed treatment units.

There are no known irreversible or irretrievable effects to vegetation if this project is implemented.

Alternative B - Cumulative Effects to Vegetation

The area and timeframes for the cumulative effects analysis for vegetation would be the same for Alternative B as in Alternative A. Likewise, thresholds, desired condition, and baselines are the same as in Alternative A.

Past, Present and Foreseeable Future Projects

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Within the last 20 years, there were two previous entries into two of the natural stands proposed for thinning in Alternative A. Both of these entries occurred in 2002, and both of the entries were for thinning treatments. The units affected were Alternative A proposed unit 15 where 53 acres of thinning overlapped with the current stand and unit 7 where 21 acres of thinning overlapped with the current proposed treatment area. There are no cumulative effects from these past treatments that would affect vegetation in Alternative B. There are no known present or future projects within the proposed unit boundaries.

There are no known irreversible effects to vegetation if Alternative B is implemented.

Alternative B would have an irretrievable loss in tree health, resulting in a loss in growth and vigor (when compared to Alternative A) in overcrowded stands.

Alternative C - Cumulative Effects to Vegetation

The area and timeframes for the cumulative effects analysis for vegetation would be the same for Alternative C as in Alternative A. Likewise, thresholds, desired condition, and baselines are the same as in Alternative A.

Past, Present and Foreseeable Future Projects

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Within the last 20 years, there were two previous entries into two of the natural stands proposed for thinning in Alternative A. Both of these entries occurred in 2002, and both of the entries were for thinning treatments. The units affected were unit 15 where 53 acres of thinning overlapped with the current stand and unit 7 where 21 acres of thinning overlapped with the current proposed treatment area. Unit 15 is the only one of these units that is proposed for treatment in Alternative C. The cumulative effects of past treatments and those currently proposed, are not expected to negatively affect vegetation. The proposed treatments are expected to improve conditions for hardwoods and pines by reducing competition for sunlight, water, and soil nutrients. Cumulative effects for unit 7 would be the same as in Alternative B. There are no other known present or future projects planned for the proposed units.

There are no known irreversible effects to vegetation if this project is implemented. Some areas proposed for thinning in Alternative A, but not treated in Alternative C would have an irretrievable loss in tree health, resulting in a loss in growth and vigor in overcrowded stands.

v) *Cumulative effects on Wildland Fuels and Fire Behavior.*

Cumulative Effects of Alternative A - It is the combined effects of the prescribed fuel treatments that have the greatest benefit in changing fire behavior. The combination of raising the crown base height in thinning units through harvest and surface fuel reduction, and stand thinning and piling to reduce surface fuels and crown bulk density within the fuels treatment units create a dynamic change in fire behavior, specifically crown fire potential. The strategic location of units along ridgelines and adjacent past fuels treatments increases the overall effectiveness of treatments.

Stand-level treatments would reduce potential fire behavior, fire related tree mortality, and spotting in treatment units. These treatments would increase the ability of fire management personnel to suppress and contain wildfires during initial and extended operations while increasing firefighter and public safety. At the landscape level, these treatments would provide connectivity between existing fuel treatments and break up the continuity of surface and crown fuels. A reduction landscape-level fire related tree mortality would help maintain stand structure in RHCAs, PACs, and HRCAs in the project area.

Modifying forest structure and treating surface fuels would create fire resilient stands (Pollet and Omi 2002, Graham et al. 2004) and restore the ecological characteristics associated with high frequency, low to moderate severity fire regimes (Kilgore 1973, Martin 1991).

Cumulative Effects of Alternative B - Stands in the area would not be fire resilient and the ecological characteristics of high frequency; low to moderate severity fire regimes would not be restored. This area of the Tahoe National Forest has a history of large, stand replacing wildfires that have occurred including the Mountain House fire of 1959 that burned over 17,000 acres and destroyed many homes in the town of Pike, the 1924 fire of 1924 that burned 4,230 acres and came to the edge of the town of Alleghany, and the Lafayette Ridge fire of 1924 that burned 17,000 acres across the river canyon. The effects of these fires include loss of structures, critical habitat for threatened and endangered species, timber, plantations and damage to soils, watershed and recreational values. The financial costs of suppression, emergency rehabilitation and restoration of these fires have been high. There is a cumulative impact from the loss and/or damage to property and natural resources and the associated financial costs mitigating these negative effects under this alternative.

Cumulative Effects of Alternative C - The effects are the same as the Proposed Action.

vi) Cumulative Effects on Air Quality:

Cumulative Effects of Alternative A - Prescribed burning conducted by Yuba River District of the Tahoe NF and private individuals would have cumulative impacts on the amount of criteria pollutants produced, visibility and human health. However, prescribed burning activities for all projects are coordinated with the state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion of emissions, thereby mitigating the potential for significant adverse air quality effects. Therefore, although prescribed burning would contribute to cumulative effects, the effects would not exceed state and local air quality standards.

Cumulative Effects of Alternative B - Under Alternative B, the project area would be subjected to long-term deposition of surface fuels. Forest fuels would continue to increase with biomass production and would out-produce the decomposition rates in this climate. The long-term chronic effects of wildfires would be higher PM_{10} emissions, mostly due to large areas of exposed soil and ash in the aftermath of a high-intensity wildfire.

Cumulative Effects of Alternative C - The effects are the same as the Proposed Action.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places, or may cause loss or destruction of significant scientific, cultural, or historical resources.

The Plum Project area has been inventoried for cultural resources. The file number for the cultural resource report is TNF02224/R2009051700006 (Krautkramer). The inventory documents the presence of prehistoric and historic archaeological sites and several isolated features. Cultural resources would be managed according to provisions of the National Historic Preservation Act (NHPA) and implementing programmatic agreements (PAs). Adverse effects to cultural resources would be avoided by project design and site avoidance following standard forest practices that have been developed to implement the applicable NHPA provisions.

This action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places**.**

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

Biological Evaluations have been completed that include analyses of potential effects to federally listed (endangered, threatened) or proposed species. These reports determine that there are no effects from any of the alternatives to any federally listed or proposed species. There is no designated critical habitat in the Tahoe National Forest.

Endangered Species: There are no federally endangered species or their habitat identified within the project area.

Threatened Species: This project is outside of the range for the Lahontan cutthroat trout and the Valley elderberry longhorn beetle. Suitable habitat is present for the California red-legged frog within the project area. Surveys were conducted to protocol, and the species was not found. Additionally, Management Requirements are included to limit activities within 300-feet of suitable habitat and limit operating periods during the wet season to insure that effects would not occur to this species. The Biological Evaluation has concluded that the action alternatives would not affect the California red-legged frog, Lahontan cutthroat trout, or the Valley elderberry longhorn beetle.

Proposed Species: There are no proposed threatened or endangered plant or animal species that occur on the west side of the Tahoe National Forest.

10. Whether the action threatens a violation of Federal, State, or local law or other requirements imposed for the protection of the environment.

Neither of the action alternatives (Alternatives A or C) would threaten a violation of Federal law or requirement imposed for the protection of the environment. Both alternatives are fully consistent with the Endangered Species Act (see No. 9 above). This EA is also in full compliance with the National Environmental Policy Act of 1969, and the California Public Resources Code (Section 5019). Alternatives A and C are fully consistent with the with the Tahoe LMP (1990) as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (2004); and comply with the National Forest Management Act (NFMA) of 1976. NFMA requires all projects to be consistent with the following elements: (a) resource protection; (b) vegetation manipulation; (c) silvicultural practices; (d) even-aged management; (e) riparian areas; (f) soil and water; and (g) diversity.

(a) Resource Protection – The integrated design of the action alternatives, including the Management Requirements listed in Chapter II of this EA and detailed in the attached appendices provide for protection of forest resources, including riparian resources, terrestrial wildlife, aquatic and plant species and their habitat, cultural resources, air quality, soil productivity, and recreational and visual quality resources.

(b) Vegetation manipulation – The proposed thinning would enhance wildlife habitat and reduce stand density to a level that would improve the long-term health of the stands, and, in combination with the reduction of ground fuels, would reduce wildfire hazard and reduce potential loss of forest habitat from catastrophic wildfire.

(c) Silvicultural practices – No timber harvesting would occur on lands classified as not suited for timber production. Standard management requirements related to the use of mechanical harvesting equipment in thinning units are designed to protect soil productivity, riparian resources and water quality, fish and wildlife, recreation, and aesthetic resources.

(d) Even-aged management – No group selection harvest or other forms of even-aged management are proposed by any of the alternatives.

(e) Riparian areas – Sierra Nevada Forest Plan Amendment (SNFPA) guidelines would be applied to the treatment of Riparian Habitat Conservation Areas (RCAs) as appropriate to protect riparian resources. All the proposed treatments in RCAs are designed to minimize disturbance of riparian vegetation, soils, and other aquatic habitat elements. A riparian conservation objective (RCO) analysis and guidelines (see Appendix C) has been developed for this project, consistent with SNFPA ROD standard and guideline 92 (SNFPA ROD, page 62).

(f) Soil and water – Working cooperatively with the California State Water Quality Control Board, the Forest Service developed pollution control measures, referred to as Best Management Practices (BMPs) that are applicable to National Forest System lands. The BMPs were evaluated by State Water Quality Control personnel as they were applied on site during management activities. After assessment of the monitoring data and completion of public workshops and hearings, the Forest Service's BMPs were certified by the State and approved by the Environmental Protection Agency (EPA) as the most effective means to control non-point source pollution.

The land treatment measures incorporated into Forest Service BMPs evolved through research and development measures, and have been monitored and modified over several decades with the expressed purpose of improving the measures and making them more effective. On site evaluations of the control measures by State regulatory agencies found the practices were effective in protecting beneficial uses and were certifiable for Forest Service application as their means to protect water quality. The Clean Water Act provided the initial test of effectiveness of the Forest Service non-point pollution control measures by requiring evaluation of the practices by regulatory agencies (State Board and EPA) and the certification and approval of the practices as the "BEST" measures for control.

BMPs are designed to accommodate site-specific conditions. They are tailor-made to account for the complexity and physical and biological variability of the natural environment. In the 1981 Management Agency Agreement between the State Water Resources Control Board and the Forest Service the State agreed that: "The practices and procedures set forth in the Forest Service document constitute sound water quality management and, as such, are the best management practices to be implemented for water quality protection and improvement on NFS lands." Further the Water Quality Control Plan for the Central Valley Regional Water Quality Control Board states "Implementation of the BMPs, in conjunction with monitoring and performance review requirements

approved by the State and Regional Boards, is the primary method of meeting the Basin Plan's water quality objectives for the activities to which the BMPs apply."

The Regional Water Quality Control Board, Central Valley Region (CVRWQCB), on 28 April 2005, adopted Resolution No. R5-2005-0052 (Resolution) which provides for a conditional waiver of the requirement to file a report of waste discharge and obtain waste discharge requirements for timber harvest activities on U.S. Forest Service (USFS) lands within the Central Valley Region. The eligibility criteria for obtaining a conditional waiver are listed below.

To be eligible for coverage under this waiver category, the project has met the definition of timber harvest activities, and would comply with all of the applicable eligibility criteria and conditions.

Eligibility Criteria:

1. USFS has conducted a multi-disciplinary review of the timber harvest proposal, including review by watershed specialists, and has specified best management practices (BMPs), and additional control measures as needed, in order to assure compliance with applicable water quality control plans.

2. USFS has conducted a cumulative watershed effects (CWE) analysis and included specific measures needed to reduce the potential for CWEs in order to assure compliance with applicable water quality control plans.

3. USFS has allowed the public and other interested parties reasonable opportunity to comment on and/or challenge individual timber harvest proposals.

This project has complied with all the "Eligibility Criteria" and "General Conditions" specified in the Regional Board's Waiver.

(g) Diversity – Many of the management requirements and/or BMPs are designed to protect soil and water resources and therefore plant and animal habitats. These standard management requirements also contribute to the diversity of the project area by maintaining or enhancing these habitats. In addition, standard management requirements include measures to protect riparian vegetation, snags, down woody debris, unique and sensitive plants and fungi, threatened, sensitive and management indicator species and their habitats. Proposed thinning and ground fuel reduction treatments would improve forest health and contribute to reductions in predicted wild fire intensity. Reductions in fuel and increased tree growth as a result of thinning are expected to provide a more diverse landscape in the long term and therefore improve the long-term sustainability of forest habitat diversity. None of the action alternatives will change the seral stage or reduce habitat quality to a degree that would lead to a trend toward listing for any Forest Service Sensitive species, nor would they alter existing forest-wide trends in habitat for Management Indicator Species. (A seral stage map is a part of the project file and is available upon request from the Yuba River Ranger District). Implementing Forest Plan Standard and Guidelines and Management Requirements (Chapter II of this EA) for this project would protect Forest Service Region 5 Sensitive species, Tahoe National Forest Management Indicator Species, and Watchlist Plants, and limit the spread of noxious weeds and invasive species. All of these protect diversity within the project area.

R5 Forest Service Sensitive Species:

Direct, indirect, and cumulative effects on fish, wildlife, and rare plants are discussed in detail in the following project documents, hereby incorporated by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates, (2) Biological Evaluation for Plants and Fungi. These documents are located in the project file and available upon request from the Yuba River Ranger District office. These effects are summarized in this document in Chapter III.

The Biological Evaluations describe in detail these effects by species. The Biological Evaluation contains the following determination statements from implementing Alternatives A or C:

- No effect to the following sensitive wildlife: bald eagle, willow flycatcher, greater sandhill crane, Sierra Nevada red fox, western red bat, northwestern pond turtle, foothill yellow-legged frog, mountain yellow-legged frog, northern leopard frog, Great Basin ramshorn snail, Lahontan Lake tui chub, hardhead.

- No effect to the following sensitive plants: *Lewisia kelloggii* ssp. *hutchisonii*.

- May affect, but is not likely to result in a trend toward federal listing or loss of viability for the following sensitive wildlife: California spotted owl, northern goshawk, Pacific fisher, American marten, California wolverine, pallid bat, and the Townsend's big-eared bat.

Weed Risk Assessment:

A weed risk assessment has determined that there is a low risk of weed introduction as a result of implementing Alternatives A or C. If equipment is coming to the project area from a weed infested area; it must be washed to reduce the risk of weed introduction. Additional requirements include the use of weed free plant materials for erosion control work – if needed, which also reduces the risk of weed introduction into the project area. The risk of weed spread from existing weed occurrences within the Plum Project area is moderate to high for both Alternatives A and C. Implementation of Alternatives A or C would reduce the amount of soil cover and canopy increasing the risk that weeds could become established in disturbed areas if a seed source is near. Since Alternative C reduces soil and canopy cover on fewer acres, it has less weed spread risk than Alternative A; however some of the Alternative C treatment areas are located near weed infestations. The risk of weed spread from existing weed occurrences is mitigated to a large extent when weed occurrences are treated prior to project implementation and annually until the seeds stored in the soil are exhausted, as proposed under Alternative A. (Refer to the detailed description of the proposed action in Chapter I of this EA.)

Management Indicator Species:

A Management Indicator Species (MIS) Assessment has been completed for this project. This report is incorporated by reference and available from the Yuba River District office upon request. The following MIS were selected for analysis for this project from the list of MIS identified in the Tahoe

National Forest Land and Management Plan: fox sparrow, mule deer, mountain quail, California spotted owl, American marten, and northern flying squirrel. The MIS analysis concluded that the effects of all action alternatives would not alter existing forest-wide trends of these MIS.

Watchlist Plants:

The project area was surveyed and a watchlist plant and plant community report has been completed. No watchlist plants were found during the project surveys. Several seeps and springs, a wet meadow, and a pond were found during the project surveys. All seeps, springs, the wet meadow, and the pond would have a 300-foot RCA and a 100-foot riparian buffer in which no harvest or ground-disturbing activities could be conducted unless otherwise agreed to by a riparian specialist (see the management requirements and RCA guidelines in Chapter II).

Agencies and Others Consulted

The Scoping letter was mailed on 7/15/10 to the following:

ACKERMAN, TIMOTHY R,

VOLKER ACKERMANN

AITKEN, GRETCHEN,

ALBRECHT, JOHN,

ALCOCK, GEORGE,

ALLEGHANY CO WATER DIST,

ALLEN, DANA,

ALLEN, LAWRENCE RICHARD,

ALLENBAUGH, MELBOURNE,

ALLENBAUGH, STEVE,

ALLENBAUGH, DEE,

AMATO, RHONDA,

ANDERSEN, KURT,

ARBOGAST, DAVID,

ASHLEY, JERRY,

BABROS, WAYNE C,

BAKER, LESLIE D,

BALSAMO, LOUIS,

BANKS, STEVEN R,

BARKER, EDDIE,

BARTON, KENZIE,

BAUGH, DEBORAH,

BAVA, STEPHEN,

BAYNE, WILLIAM,

BECKETT, EVELYN,

BEELER, PAUL V,

BENNETT, LINDA,

BLACK, BRUCE T,

BOYER, WILLIAM,

BROCHON, MARTIAL,

BROWN, FRED,

BROWN, GREG,

BROWN, JOAN,

BUCZKOWSKE, LEO & JOE-ANN,

TIMOTHY J. CARNES

CASEY, ETTA L,

CASEY, MARJORIE J EST OF,

CHARITON, ALBERT,

CHITTENDEN, GENE,

CIPOLLONE, TOM,

CLAUSET, JOHN,

COCHRAN, LESLIE,

COLLETT, CHARLES,

COLUMBIA CHAN GOLD MG CO,

COONS, ERCELL,

COONS, ERCELL E,

COURPET, LOREN,

CUNHA, FRANK,

DANIELS, BRIAN,

DICKEY EXPLORATION CO,

DOLGOFF, FARIS,

DOWNEY, RICHARD J,

DREWS, STEVE,

CHERYL DURRETT

EIDE, HARRY S,

EIDE, HANS,

EIDE, KEN,

EL DORADO PLUMBAGO MINES

EMERY, DAVID,

ENGEL, EVELYN,

FAIRCLOUGH, DONALD,

FARRELL, JONATHAN,

FINNEY, ERNEST,

VOLKER FLACHE

FOREST CITY HISTORICAL ASSOC. ATTN: BIRDSONG SUNDSTROM

FOREST CITY WATER SYSTEM,

FORKNER, BRIAN L,

FORSMAN, GERARD F,

FORTIN, IVAN,

FOX, DELBERT,

FRADY, CRAIG,

FRENCH, DAVID,

FRENCH, RICHARD,

FRENCH, STEVE,

GOODE, ALFRED L & BARBARA G J,

HAJNY, HAROLD,

HALL, ALLEN,

HAUCK, ARTHUR J,

HENDRICKS, TED,

HEBERT, ROBERT,

ROBERTA HOLMEN

HUMBLE, STEPHEN SCOTT TTEE,

HURLEY, PATRICK,

JACKSON, HAROLD,

IVY, RODNEY,

MARTIN A. JACKSON

JAMERSON, PAUL R,

JEFFREY, DAVID,

JENSS, JOHN G,

JOHNSON, DONALD,

JOHNSON, LINDA K,

CLINTON WAYNE JONES

JULIAN, CHARLES,

JULIAN, LAWRENCE,

KAUFMAN, CHARLES,

KEENE, MARK,

KISTLE, RON,

KLEMENOK, AARON,

KLING, JOHN,

KNOWLES, JOHN,

KRAKE, KEN,

LAYMON, JEFFREY,

LEXA, DESTINY,

LEXA, SHILO,

LOCATELLI, DIANE EST OF,

LOMBARDO, MIKE,

LOVELAND, ARTHUR,

LOVING, MARK,

LISA LUZZI

MACRI, RONALD,

MADRE FILON A CA GEN PRTNSHIP,

MAIN, PETER H,

PETER MANDEVILLE

MARGULIS, JACQUELINE,

MASON, DANIEL M,

DAVID MASON

MASON, HAROLD,

MATTHEW, MATTHEW,

MCDONALD, NORBERT MICHAEL,

MCDONNELL, DAVID L,

MCLEOD, DONALD W,

MCLEOD, INEZ,

MCNEIL, ARTHUR,

MCNEIL, JAMES,

MCNEIL, ROBERT,

MEHRMANN, TOBYN,

MEISTER, MICHELLE,

MENNITI FAMILY,

MEYER, ANDREW,

MILBURN, FRANK,

MILLER, LUCRETIA,

MILLER, MICHAEL M,

MILLER, REID,

MILLER, SANDRA T,

MILLER, STEPHANIE,

MILTON, FREDDIE,

MITCHELL, CHARLES TTEE,

MITSCHKE, RAY,

MOELLMAN, THOMAS R,

MORNING GLORY GOLD MINES,

MORRIS, RALPH,

MOSHER, GARY,

MUSSANO, ROBERT,

NITZ, MICHAEL,

ORIGINAL 16 TO 1 MINE INC,

O'ROURKE, CONNIE,

PARMELE, GREGORY,

PETERSON, MICHAEL D,

PITMAN, ROBERT,

FRANCIS B. PLANT

PLIOCENE RIDGE COM SERV DIST,

PORTER, SEAN,

PUTMAN, JOHN,

PUTMAN, KEVIN,

GREGORY RADDUE

RALSTON, RONALD,

RAUB, GORDON A,

RICHARD E. RAY

RENFREE, LINDA M,

RICH, WILLIAM L EST OF,

RISING SUN DEVELOPMENT CO,

ROBERTS, JAMES W,

ROGERS, CASSIE,

RUEDRICH, WALTER P ESTATE,

SANDEZ, DAMIAN,

SCHMIDT, JULIA,

SENGER, Dave,
SIBLEY, WILLIAM,

SIERRA COUNTY,

SIERRA COUNTY WATER DISTRICT,

SIERRA PACIFIC INDUSTRIES,

SIERRA-PLUMAS SCHOOL DISTRICT,

SLACK, BILL,

SMITH, JAMES,

SMITH, RON,

SNOW, ALLAN,

SORG, DENNIS,

SPOLINI, VICTOR,

STICHA, JAN,

STOLL, MATTHEW,

STREHL, DOUGLAS

GLENN SUNDSTROM

SUTTON, JOSEPH,

SVETICH, MICHAEL R,

TENNEY, OREGON B & VICTORIA,

THOMPSON, MARK,

UNLAND, LAURA L,

VAN HORNE, THOMAS S,

VIEIRA, LAWRENCE STEVEN,

DALE A. VON RUDEN JR.

WALKER, DEAN

WALKER, ROBERT E,

WARHOLIC, MICHAEL,

WATSON, JOHN C,

WEISS, A R,

DALE WELSH

WHITE, BELLA L & JACKIE L,

WHITE, BUD,

WILCOX, ANTHONY,

WILKERSON, REBECCA,

WILLIAMS, JOHN,

WILSON, LOREN

WITTKOPP, RAYMOND W,

WOOD, MICHAEL W,	SIERRA FOREST LEGACY	MIKE PICKERING
YOUNT, JAMES,	DICK ARTLEY	JERRY BLOOM
DARCA MORGAN - ZUMALT-MCGARRY, JOANNA M,		
STEPHEN BENNER		

Scoping responses/requests were received from:

David M. Senger

Don Dickey of Dickey Exploration Co., Inc.,

Raymond W. Wittkopp

Ernest and Nancy Finney

Alleghany County Water District

Michael Miller of the Original Sixteen to One Mine

Stephen Benner of the Forest Issues Group (FIG)

Jerry Bloom for Forest Issues Group

Ken Wilde of Sierra Pacific Industries (SPI)

Matthew Stoll

Robert Walker

Additional Comments

Documents Incorporated By Reference, and/or Available Upon Request, or Attached as Appendices

Project Maps (*Appendix A*)
Responses to Public Scoping Comments (*Appendix B*)
Best Management Practices/Watershed Data (*Appendix C)*
Cumulative Watershed Effects Analysis *(in Appendix C)*
Riparian Conservation Area Guidelines *(in Appendix C)*
Riparian Conservation Objectives Analysis *(in Appendix C)*
Vegetation Data (*Appendix D)*
References Cited (*Appendix F*)
Cultural Resources Report *(Administratively confidential)*
Wildland Fire/Fuels Report *(in Project File)*
Air Quality Report *(in Project File)*
Management Indicator Species (MIS) Assessment *(in Project File)*
Plant and Animal Biological Evaluations *(in Project File)*
Other References/Citations *(in Project File)*
Roads Analysis *(in Project File)*
Tahoe National Forest Sensitive Plant Standards and Guidelines *(Incorporated by Reference)*
Soils Report (in Project File)
Silvicultural Report *(in Project File)*
Watchlist Plant and Plant Community Report *(in Project File)*
Weed Risk Assessment *(in Project File)*